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THE PACKER AND THE FARMER.[1]

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In every phase of thinking, in our efforts to reduce our problems to "simple terms," we are in danger of securing simplicity at the expense of truth. On the other hand, in our efforts to analyze and to inspect and to classify detail, we may fail altogether to see the large central truth that lies before our faces. Both these dangers are especially likely to beset us in our thinking about industries and economic relations in industry.

The meat industry particularly is not a simple one. Even the name "meat industry," on reflection, is seen to be a misnomer. We think of it as growing and fattening of livestock (the farmers' part) and the conversion of live stock into meats as a food (the packers' part). But it is not as plain a case as that. The growing and fattening of livestock, when you come to look at it, becomes instead, in considerable measure, a method of marketing corn and other farm crops. And when the animal is grown and fattened and sent to slaughter it is found to consist not only of meat but of material for shoes, for oleomargarine that competes as a substitute for dairyman's butter, material for fertilizer, stock food, tallow and oils, glue.

Most manufacturers assemble their various raw materials and then proceed to make their product. The packers buy a steer which is a storehouse of many materials with the breath of life in it and a switching tail, and then proceed to disassemble—so to speak—the

[1] Paper read at the eleventh annual meeting of the American Farm Economic Association, January 1, 1921.

various raw materials they have bought in that steer. This disassembling is done on the killing floor of the packing plant. The raw materials which the farmer shipped in one living package, as it were, are first "unpacked" on the killing floor and then sent to the various departments of the packing plant to be processed and manufactured.

The raising of livestock is an industry where there is "integration" in many cases; not so complete as in the Steel Corporation, for example, where the integration extends back by the company's own transportation service to the company's own ore lands, coal lands and coke plants. But the farmer who raises the feed to feed his stock and who owns his own land is, in that far, an "integrated" farmer. Right now the farmers are considering whether a good deal more integration would not be better for them.

The large packers are also integrated—integrated almost from the farmer's dooryard to the butcher's block, as where one large packer buys hogs in the country in Iowa, ships them to his own concentration station nearby; transports them to Boston in his own double deck cars, which run in a constant "shuttle" movement between the Iowa station and his packing plants in New England—slaughters them there, packs and sells the meat and the lard through his own packing and selling companies, and then buys back the scraps from the butcher's block for rendering by his own rendering company.

These are only a few indications of the fact that the meat industry is not a simple one. I wish to develop somewhat more fully two or three phases of the industry where it appears to me that much of the public discussion has been along too "simple" and "self-evident" lines, and where we need instead to face the real complexity of the problem and seek an understanding in the light of all its elements. I may say that as scientists what all of us are trying to do is to get the public to see these things as they are, and not to take too simple a view of simplicity which is not there, and not at the same time forget the big central outlines that right-thinking perhaps will develop in any subject.

I may as well say at this point that I do not intend to discuss the Federal Trade Commission's report on the packers, nor the consent decree, nor the packer legislation other than to say this: that what the farmer needs in his relation with the packers is an open road for his products on their way to the ultimate consumer. The farmer's back door is open to the land and the bounty of nature. From his front door the highway of commerce leads to the stockyards and the livestock markets, and thence through the slaughter houses to the re-

frigerator cars and by way of the cars to the storage and distribution houses in the great centers of population. Simply put, that is where the main road runs. We must not forget that there are many cross roads, many short stretches running this way and that, many byways and bridle paths, but that is the main highway to the consumer.

Is the road open all the way? That was the question toward which the Federal Trade Commission's inquiry was directed. To open the road and keep it open all the way to the end, is the purpose of the legislation that Congress is considering. For the farmer needs not simply that the road to the stockyards shall be clear. The back door of the packing house opens to the stockyard; from its front door runs the highway of commerce by way of the refrigerator cars to the great cities. Any packer in order to bid competitively—in real competition—for the farmer's livestock in the yards, must have assurance that the road from his plant to the great cities is open. If a packer knows, or thinks, the road, though open to a competing packer, is closed or partly closed to him, he will not bid in full competition for the livestock. So the farmer needs the road open from his farm clear to the end. Whether it now is open, and how to keep it so, are questions I will not discuss. Much water and much printer's ink have gone over the dam since the Federal Trade Commission made its report. I propose instead to speak of certain matters that concern the future outlook as regards the farmer and the packer.

Whatsoever the facts have been, whether the consent decree succeeds or fails, whether legislation is passed or not, the livestock farmers of the country will need—

First a better system of farm accounting and a better understanding of their own costs;

Second, a better understanding of the packers' costs and the packers' accounting systems;

Third, a better market information service; and

Fourth, a better system of marketing livestock.

Having worked out these four things more or less definitely, the farmers will be in a far stronger position from which to enter into that close and intelligent interrelationship which should exist between the farmers and the packers. The prosperity of the packer and of the farmer is necessary in the long-time public interest, and each performs a service worthy of a good reward.

So long as land and human stomachs exist—the one still fertile and the other still hungry—farmers will be necessary to the race; and so long as the majority of those human stomachs are located hundreds

or thousands of miles from the best area for livestock production, big scale packing business will be necessary. No sensible man can question these broad facts.

The real problems are what is the fair price that the hungry stomach ought to pay for its food, what share of that price ought to go to the packer and what share to the farmer, and how to organize the industry to the best advantage so that the highway from the land to the distant hungry stomach shall be open, direct, and economical—shall be open for the big independent packer, and the smaller independent packer, as well as for the "Big Five," and even open for the farmer if he desires to "integrate" to the end of the road. And not to make our thinking too simple, the cross roads and byways and bridle paths within State lines should be kept open for the small slaughtering plants and the local butchers. If the road is open and each contestant for the job of feeding the hungry stomach, whether near or far, is given a fair show, I think the competition of service and price in the course of a few years will considerably change the map of the packing industry. If the big packers, the little packers, and the farmers' coöperatives are put on the mettle of their efficiency, with no strangle holds permitted and with the spot light on the whole performance, a pleasant time will be had by all. I think the indications are that in such a contest the smaller packers and the farmers would get a substantial share of the business, the big packers would come out of it somewhat leaner but better for the exercise, and that the hungry stomach would have more food for less money.

I have said that one of the first needs of the farmers is a better system of farm accounting and a better understanding of their own costs; and here I want to repeat that I am speaking for myself only and not for the Federal Trade Commission, and to repeat that I am throwing these matters out merely as suggestions from a somewhat detached outside point of view. I am a great believer in cost accounting, but cost accounting in this country is in danger of becoming a mere tool of the propagandist. Things are getting to the pass where cost accounting might almost be defined as the science of making the public think you need a higher price.

Mark Twain, it seems, had an antipathy to the English novelist Jane Austen—so much so that he once remarked that the absence of Jane Austen's novels from a library would make a fairly good library of a library that didn't have any books at all. (Laughter.) So the absence of propaganda from the cost accounting of an industry is greatly to be desired even if the industry hasn't any accounting system whatever.

Farm cost accounting is necessary. It is now but in its infancy, it should have a great development. But if it is to stand the farmers in good stead in guiding their own business, and if it is to be genuinely useful to them in their long-time relations with the public, it must keep clear of the kind of "propaganda" that tries to mislead. Cost accounting must be able to stand four-square to the winds of adverse criticism. Only if it shows the facts as they are, can it stand the test.

Farming is an intricate business from a cost accounting point of view, because the farm is not only an integrated business but a joint-product, and to some extent a by-product, business; and especially a business exposed to the hazard of wind and weather. It involves inter-departmental profits, allocations of costs, allowances for depreciation and appreciation, the question of what to do with interest, the problem of the tenant farmer; and, most of all, the problem of risk. Absence of adequate records and difficulty in selecting representative farms, add to the complexity of the situation, when one tries to present cost statistics in extenso for the entire country or a large area.

If a propagandist wishes to prove that the farmers need a higher price for a particular product, it is easy—in this maze of accounting—to do so; but if he colors the cost too high, the result may be to turn many farmers from producing that product though it may actually be relatively or absolutely a very profitable one. Another possible result, is that the public will fail to believe; and the last state of the farmer will be worse than the first. Thus the propagandist is dealing with a two-edged sword of error. It is better policy to seek the truth of and for itself, and to test out the costs by every practical device to assure their soundness.

In a manufacturing business, a sound accountant insists that the cost figures must tie into the profit and loss accounts, which show the financial results of the whole enterprise. This is a basic check; for the sum of the cost of all the various products of a manufacturing plant cannot be greater or less than the total amount of money spent in producing them. The merchant who said he lost money on every suit of clothes he sold, but made money because he sold so many, evidently had a cost system that didn't check to his profit and loss account.

So the farm accountant would do well to check the sum of his livestock costs, his grain costs, his milk costs, etc., into the total results of the farm. This is admittedly a task of the greatest technical dif-

ficulty. But it should be undertaken and some practical way found for testing the reliability of the costs of the various separate products, so that the cost book and the bank book will tell substantially the same story.

Interest and rent are expenses that closely concern the farmer whose land is mortgaged and the tenant who has to pay the rent out of his share of the crops. But the city man pays the same price for bread or for meat coming from a free farm as from a mortgaged farm; from a farm worked by the owner as from one worked by a tenant. The city man is not concerned whether part of the farmer's share of his bread money or meat money goes to pay interest on the mortgage or whether the farmer keeps it all in his own jeans. He is not concerned as to what bargain the tenant and the owner may have made as to how they will divide their share of what he pays for food.

The city man, the public, only says, "Here is an investment in land and equipment used to produce food for me. If I want to continue to have food, I suppose I must pay enough to repay the cost of producing it plus a fair return on that investment. If most of the profit or all of it has to go to the mortgage holder or the landlord, I'm sorry but it's not my lookout. If the owner or the tenant has little or no capital, he will have to do as other folks do, gradually acquire capital out of the savings of labor and managerial enterprise. I'll pay him decently for his labor and wages of management but that is all I can be expected to do. I can't afford to pay two profits on the same capital."

This kind of speech by the public is only another way of saying, that, from the public point of view, interest is not a cost but a part of the return on the investment.

In talking with an officer of one of the big packers at the time of the beginning of the investigation of their books, the Federal Trade Commission's examiners asked if the company carried interest as a cost, and said that it was not the practice of the Commission to so regard it. The packing house officer replied:

"You will not find interest as a cost on the books of this company. Some of the other companies may carry it, but it is not properly an item of cost."

And he added:

"I hope when you come to investigate the cost of producing livestock you will not allow interest as a cost there, but that you will treat both branches of the meat industry alike."

While from one point of view, the public does not care between

whom the return on investment is divided, it is greatly interested in the problem of farm mortgages and the tenant farmer. Hence any statement of farm accounting should show interest or rent as separate items so that we can see just how well or how ill the farmer or tenant is doing, as compared with the mortgage holder or the landlord.

Another way of looking at interest is to take the point of view not of the farm investment as a whole, but of the mortgaged farmer and the tenant. The city man, the public, then says to the man who actually grows the grain and the livestock,

"Here, how much equity have you got in this business? I will pay you your costs, your labor and wages of management, I'll pay your rent, and your interest, and above that, I'll pay you a fair return on your own actual equity in the investment. Your equity may be 40 percent of the value of the farm, or it may be only half of the farm machinery, but whatever it is I'll pay you a return on what you actually own. I can't be expected to pay you a return on what somebody else owns."

In speaking of interest on investment I have had in mind, the investment in land, buildings, drainage, etc.—the permanent investment.

The risks of farming and raising livestock are hard to measure. It is a principle of cost accounting that any risk or hazard which is insurable is a definite item which can and should be put into cost. We have hail insurance, and tornado insurance, but weather in general and the life of livestock are scarcely to be insured. And as for the marketing of livestock, it would be a very hardy insurance company that would undertake the hazards of the fluctuating prices that the farmer and ranchman are confronted with. The tables of mortality of profits, if compiled, would be staggering and the insurance companies are content to let the farmer carry the risk himself. He does not even have the quasi-insurance of a hedging market as in grain.

For weather, animal diseases, and for the peril of the livestock markets, no insurance has been devised. They are part of the risk of the business. They must be covered in the profit and the public must consider this in thinking of what is a fair rate of return to the farmer on his investment. The higher the risk, the higher the return should be.

This idea of paying cost plus a fair profit is of course not a sound way of talking, as economic theory goes. We have fallen into it especially during the war and I am merely using it to make the point clear. The real fact is that the city man, the public, will pay for bread and meat as little as he can or as much as he has to, as forced

by the conditions of the market. And his only protection is to look sharp to prevent monopolization or combination from dictating the price instead of supply and demand. But the public in recent years has been thinking a lot about prices and whether they are reasonable, and about profiteering. It has come to feel that price ought to have some relation to cost, and consequently business has come to look upon cost accounting as a lever to pry up prices or, in the last few months, to keep them from going down—that statement is too general; I do not mean this in a broad way. There is a tendency in propaganda cost accounting to try to get all the items in that will make the price seem reasonable, or keep it, as I say, from going down. I do not mean what I say here to be any general condemnation of business practice or farm accounting or anything else.

After all in the long run (barring some powerful restraint) cost and profits, in any industry, determine the broad swings in the curve of supply and demand and price. And after all we may come to recognize some time that all our great basic necessities of food, shelter, fuel and clothing are charged with a public interest. When that time comes, true costs will be the most important economic facts in the world and the propagandist will have his period of greatest opportunity. But it will also be his Waterloo, for in that day nothing will stand but the truth.

Let me say that the farmer and livestock producer in their future relations with the packers need the advantage of a thorough understanding not only of their own costs but of the packers' costs, for the packer "unpacks" the living package they send him on the hoof, and processes and markets their various livestock products for them. So it is important that they should understand fully about the margin or commission—so to speak—which the packer takes for his services.

Packer accounting, like farm accounting, is a difficult subject, and for much the same reasons. It is not one business but an integration, even an agglomeration of businesses. Allocations are necessary, transfers of material must be followed through a multiplicity of processes and departments, and sales to subsidiary companies must be watched. Immense inventories are carried and a cent or two difference in the figures set on inventories makes a striking difference in the year's profits. It is a maze of accounting, if ever one was.

Costs of hundreds of products are kept in great detail, but what is the principle of it all? It is, in general, the main product-byproduct principle, which when analyzed means that "cost" is cost plus an unstated quantity of profit or loss.

I can perhaps best illustrate this from a published article by one of the big packing companies explaining, on request, the reasonableness of 43 cent hams at wholesale from 13 cent hogs. For however well the by-product accounting works, in theory, on cattle, it doesn't work at all on hogs. I read from the packers' article referred to:

"The cost of all the portions of the hog may amount to a sum which averages thirteen cents a pound, but no accounting system has ever been evolved or ever can be evolved for determining the actual cost for each separate portion, in view of the fact that each separate portion has a market value different from the others.

"The nearest approach which can be made toward determining the cost of the ham lies in the ascertainment of its market value. If we can sell green hams on the open market for 33 cents a pound, as was the case at the time of your query, it follows that we can buy them on the market for 33 cents a pound and it is reasonable, therefore, to figure that the green hams stand to cost that figure, even when they come from a hog which cost but 13 cents. On the same basis of figuring, the feet from the same 13 cent hog cost six cents, because that represents their worth on the market. There is no other way to determine the cost of these various portions." That is the company's own statement.

This means that not knowing the true cost of the green ham, the packer says, "It costs me what I could get for it." In other words, the arbitrary cost set on the green ham is in this case its cost plus a large profit. Thus starting the so-called "cost" at 33 cents with a large undisclosed profit, the actual costs of processing are added making 40 cents, and the accounting profit is three cents a pound which looks modest but must be apologized for in view of the one eighth of a cent profit advertised on meat. That explains the difference between the 33 cent green ham and the 43 cent price charged. But what about the difference between the 13 cent hog and the 33 cent green ham? The shrink of the live hog in slaughtering of course has to be taken into consideration. That would raise the live cost somewhat above the original 13 cents a pound, and the cost of killing and dressing would increase it somewhat further. But suppose the packer could get on the market for the green ham, the green shoulder, the green bacon, the unrendered lard, and all the other green parts that are saved, an average price higher than the actual average shrunk cost of the hog after it is killed and dressed. Would you not say that the difference between the actual shrunk cost of the hog as it comes from the killing floor and the average price that could be got for the green

products is a profit, and a profit that is undisclosed under this so-called "cost" system? It seems clear to me that 33 cents is not the "cost" of the green ham on any true principle of accounting.

The by-product theory of beef accounting assumes that the packers are in the beef business but not in the hide business, not in the oleo business, not in the soap business, not in the fertilizer business, not in the rendering business or glue business. But the fact is they *are* in *all* these businesses, and more. They are large businesses and the packers are important factors in them.

Let us take the steer. There is only one actual fact about the price paid for the steer. The same price was paid for every pound of him —including the 25 percent of the weight that shrinks and disappears on the killing floor. The same price per pound was paid for the hoofs, the tail, the intestinal casings, and for the porterhouse steak; and that same price was paid for the hide and the fats. But the hoofs are not so useful as the steak, nor the casings so useful as the hide. Consequently when it comes to selling the different products, some sell below the actual average cost, some above it; some products therefore actually make a large loss, some make a considerable gain, and the average gain is the only figure that counts. That is a definite actual cost plan in which cost is cost, profit is profit, and loss is loss. It is a straight joint-product cost, crude and unadorned by fancy.

If you object to this plan as harsh and lacking in practical utility, that is pretty much so. There is but one other theory which will enable you to avoid 33 cents as the "cost" of green hams from a 13 cent hog. That is the theory of joint-products and allocated costs.

This is a theory which must depend on psychology for its actuality, but which at any rate keeps profit and loss out of costs. It recognizes that the carcass is worth more than the tail or the hoofs or the horns. It recognizes that the hide and the oil are important factors in the worth of the animal. It therefore emphasizes the psychology of the buyer and shows that in paying a given price for an animal the buyer has in mind not only what the packer can get for the meat but what he can get for the hide, the oil, and the other principal products—and the less important ones—so far as he can carry them in mind. If the buyer in buying, as part of his buying information, has currently before him the market prices not only of meat, but of hides, oils and other principal products, it seems a reasonable proposition to allocate the amount that he pays for the animal over the different products in proportion to their market price at the time of the purchase, or their price over some representative past period of time. This is very dif-

ferent from the real market price becoming a part of the cost and thereby serving to put an unstated amount of profit or loss into cost. Instead, this joint-product, allocated-cost theory starts with actual cost and ends with actual cost, but distributes that actual amount over the different products on the basis of their relative value.

I want to say that I throw that idea out only as a suggestion. I have stated it somewhat emphatically, perhaps, but I want to throw it out as something to be thought over, not as anything which can be said to mean the last word, because, as I have said, it is a technical, difficult subject, and we are all here to learn in considering it.

The cost accounting for different departments and different products in the packing business is a most technical and difficult subject. That is all the more reason that the principles underlying it should be carefully considered in order that we may be sure of having those principles sound.

Just as the key figure in the farm cost accounting is the actual profit or loss made by the total farming operations, so the key figure in the case of a packing company is the total profit made by the business including its subsidiaries. Any adequate accounting system of departmental and subsidiary companies' cost accounts ought to tie in to the consolidated profit and loss account of the parent company and all its subsidiaries.

In view of the present methods—not similar in all cases—by which the large packers keep their cost accounts and their financial accounts, it would be a stupendous undertaking to attempt to check the accuracy even of the financial figures. There would be a great advantage to the packing industry, the farmer, and the public, if the financial accounts of the different packing companies were organized on some uniform basis so as to provide control accounts showing the facts that it is important to know, and making it easy to audit and verify the same for the purpose of satisfying the public as to the true earnings. Such a system once established would repay in benefit many times the cost of putting it into effect.

In order to match the packer in the market place and get a fair price, the farmer needs an adequate market information service—one substantially as good as the packers' information service. If it pays the packer to know, it in general would pay the farmer. The Bureau of Markets has made a start in this work. I believe its hands should be strengthened, its work enlarged, and a reliable and extensive service—valuable to all three factors in our equation, farmer, packer, consumer—should be instituted. The packers grade their animals

and their meats in many grades. It is of the utmost importance to the farmer and consumer in any market information service that grades be established and reported in considerably greater detail than now. It is not necessary to go to the extreme of 37 or 38 grades of cattle for killing lots, but reasonably definite grades should be standardized and the price of each grade of steer should be correlated as nearly as practicable with the price of the grade of meat coming from that grade of steer. Only so will there be clear public knowledge all along the line.

Moreover, it should be possible, in a market information service such as is proposed, to have the prices—not estimates, not observations—but actual weighted average prices, run off by electrical calculating machines, right at the scales so as to give actual results, summarized by a short time after the market closes each day. This may sound like attempting a good deal, but the intensity of the light which will emanate from such a system will be worth much more than it costs, in my judgment.

Market information on the demand for and prices of meat is a larger problem, but a careful, exact study of how the packers handle it, their forms, their system, ought to result in some practicable plan for having current public knowledge of meat prices correlated with the grades of animals from which they were derived.

Livestock, meats, hides, oils and other animal products—the supply, demand, and price—are of interest to the farmer and the consumer. Some correlated service of information should be worked out. It is a subject worthy of thought.

The farmer I have said is considering a greater degree of integration in the livestock business. The question is whether there lies in the near future some practical coöperative arrangement for the farmer to take his animals clear through the yards to the packers' back door, and possibly on through the packers' front door to the retail trade or the consumer. It is an idea of such magnitude that a very wary examination should be made of the various phases and elements of it. A beginner does not do well to try to climb the more dangerous Alpine peaks. He had better acquire experience first on the lesser climbs and know just what he is about before he undertakes the Matterhorn. He may decide that it is well to let the Matterhorn go unclimbed so far as he is concerned.

The big practical problem of the last 30 years and of today, is how to avoid the gluts and famines, the sharp, disastrous fluctuations of the livestock market place. That problem should be solved right, before the farmer takes on anything more.

It does not seem likely that the nearest road to this solution lies through the farmers' coöperative packing plant. The mistakes of co-operative packing plants in the past need to be charted, and experiments designed to avoid past pitfalls no doubt need to be made, but the main heave of the farmers' energy should be applied squarely on the proposition of getting animals to the present markets in a steadier flow.

Everybody will be gainer by it, if it can be accomplished. I am not talking of any plan to curtail the production of livestock. I am against any concerted action with that object. What I do mean is this—with the total supply free and uncontrolled, let us try first to learn what that supply is and and where it is, and then see to it that its daily flow shall be as steady and sure as possible. The effect of such a policy should be, not to increase at all the total aggregate price of a year's supply of livestock but to assure steadier price throughout the year, so that one small producer who risks his work of a year, or two, or three, on a single market day, will have a fairer chance of coming out with a reasonable sum of money, instead of taking the gamble he now must take.

The coördination of farmers' livestock shipping associations, the forming of large coöperative commission houses in the markets where they are not already established, the creation of a special information service to organize the flow of stock—these are the principal outlines for this present effort. Possibly the coöperative acquisition of the stock yards should be favored, if there are contracts to assure that the packers will buy in the yards, and pay yardage on any animals they buy in the country.

The thought I wish to repeat most strongly is that the public has a right to an uncontrolled supply of food animals. No plan and no act should infringe upon that principle. But the farmer should assert the right to steady the flow of that uncontrolled total supply—to steady it, in his own interest and in the interest of the railroads, the packers, and the hungry stomach.

BEEF CATTLE FEEDING COSTS.[1]

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We have come to think of the phrase "beef cattle feeding" as referring to that short period in the animal's life during which it is confined within the limits of a few square feet upon a Corn Belt farm, and to consider the operation mainly with reference to the large quantities of highly concentrated farm products consumed by the animal. We must not overlook, however, the highly important fact that this steer is being used at the same time and in the same operation as a means of converting the farm by-products into marketable commodities for human consumption. Chief among these otherwise probably unmarketable by-products are straw, stover, leguminous roughages, and hay, a considerable amount of which will always be grown. While the grain feeding of cattle has been an important part of the livestock industry, the beef animal has always furnished the principal means of utilizing the production of that seventy-five percent of the land area which lies outside our improved farm area.

It has been estimated by livestock authorities of the United States that from 80 to 95 percent of the cattle slaughtered on the range, or arriving at market directly from the range, have never tasted grains of any kind; while as large a portion as 20 to 40 percent of the cattle slaughtered on the farm, or arriving at market directly from the strictly corn regions of the United States have never been fed grain. This means roughly that from two thirds to four fifths of the entire beef cattle population of the United States is produced entirely upon roughages, principally grass. Therefore, while the figures which may be presented represent conditions for that type of meat production under study, *i.e.*, winter feeding of beef cattle, they apply to but a part of the industry as a whole.

The winter feeding of stocker animals, whether cattle, sheep or stocker hogs, is one of the most elastic enterprises of the farm. Other than some fore-hand preparation in the way of equipment and possibly credit, short feeding is altogether a matter of choice on the

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ordinary mid-western farm, that carries a well-balanced rotation. The farmer can easily change his method of marketing crops from that of driving them to market to that of hauling them whenever he feels that selling his feedable crops will pay him better than putting them through cattle, or when it may appear to him that the future does not justify his paying the prices asked for feeder animals, or again when a series of losses leads him to discontinue feeding until some time that appears more advantageous.

And so, after the experiences of the past two winters, when many feeders took losses, and in view of the present credit stringency, it is not surprising to find a marked decrease in the number of beef cattle on feed today. In Illinois the livestock surveys of the Illinois Farm Bureau show that the feeding of cattle this winter has dropped off in that state from 30 to 33 percent as compared with what it was one year ago. The experiences of the Office of Farm Management in establishing the five cattle feeding routes this winter, linked together with gossip which has been picked up while in the field, indicates that cattle feeding generally throughout the Corn Belt is right now about seventy-five percent of normal.

This falling off in feeding is not entirely the result of the past year's reverses, but is in large measure due to present credit conditions and the indefinite outlook. Experience has indicated to many feeders that in normal times there has been too much gamble in feeding, and, as the feeder interprets the present in the light of the past, he is becoming more and more convinced that the long time average results must show less risk and greater remuneration if feeding is to be resumed. This may not mean that he will go out of the field of livestock production, but that he will work other types of livestock into his system of farming unless he can indulge in cattle feeding with better assurance of remuneration.

Let us observe the cattle feeding situation during the past five years, using the year 1915 as a base. In Chart I the monthly prices of cattle and the three principal feeding stuffs, corn, hay and cottonseed meal, are expressed in index figures, the base being the average of the twelve months during 1915. It is noticeable that during 1916 the price indices followed very closely together. During the first month in the year 1917 hay prices dropped to about one half what they were in December, 1916, but the other two feeds, corn and cottonseed meal, began to advance above cattle prices in this same month. All prices used in making this chart were gathered by the Bureau of Crop Estimates and indicate average farm prices, or, in the case of cottonseed meal, the average prices received by local country dealers.

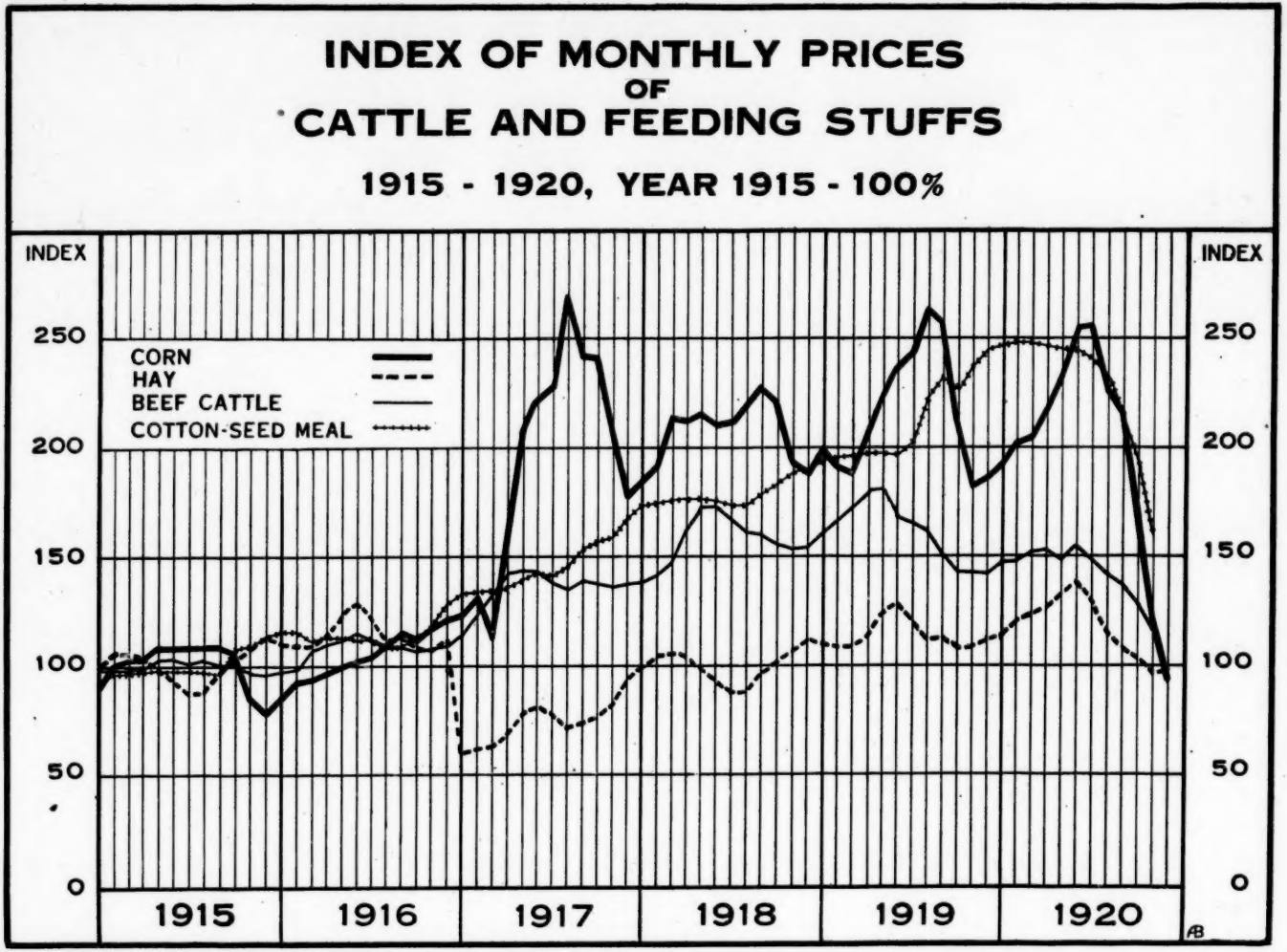
INDEX OF MONTHLY PRICES
OF
CATTLE AND FEEDING STUFFS
1915 - 1920, YEAR 1915 - 100%
INDEX
250
200
150
100
50
0
CORN
HAY
BEEF CATTLE
COTTON-SEED MEAL
1915
1916
1917
1918
1919
1920
AB

CHART I.

During the past four years there appears to be little correlation between beef cattle prices and the prices of corn—the one feedable crop which constitutes from 65 to 70 percent of the steer's winter feed bill. (Corn either in the form of grain or in the silo has been found to constitute from 65 to 70 percent of the value of all feeding stuffs going toward making the gain in the winter-fed cattle under study.) After four years of high corn and low cattle prices, we are now in the midst of a time of low feed prices and somewhat better cattle prices relatively but with other factors, such as lack of credit, the unsettled strength of meat demands, and a vivid recollection of recent losses, serving to offset this advantage and thus to lower the number of feeder cattle in the Corn Belt feed lots.

General Relations of Winter Cattle Feeding to the Farm Organization.

The Office of Farm Management and Farm Economics, in coöperation with the Bureau of Animal Industry and the State Experiment Stations of the states where work is conducted, began the study of beef cattle feeding costs covering the feeding operations of the winter of 1918–19. Five general areas, one in each of five Corn Belt States, were selected, namely, east central Indiana, north central Illinois, west central Iowa, eastern Nebraska and central Missouri. As this work did not start until the summer of 1919, the figures on the feeding in the winter of 1918–19 are survey figures. In the fall of 1919 five cattle feeding routes were established, each route aiming to carry twenty-five farms. Surveys were again taken in the summer of 1920. All figures which I will give for the winter 1919–20 are those for the route farms and survey farms combined unless otherwise specified.

In these studies a survey of the whole farm business was made wherever cost figures were gathered upon feeding cattle. In fact, in all our livestock cost work, concerted effort will be made to obtain a farm business analysis from each farm supplying cost figures upon animal enterprises. This is done for the purpose of studying the relation of farm enterprises, the economic place of the livestock enterprise in the organization and operation of each farm or group of farms, and also, as I later hope to bring out, to help in getting a better perspective of enterprise cost figures in their relation to farm profits.

From the five hundred or more farms surveyed for the 1919 crop year, 333 have been selected (Table I) as the farms giving in most accurate detail the total quantities of feedable crops produced and their ultimate disposition. It is first of interest to note that practically 74

Chart I.

percent of the entire area of these farms is in cultivated crops other than rotation pasture. Approximately 44 percent of this cultivated area was in corn in 1919. The remainder of the cultivated area is devoted principally to hays, wheat and oats. One fourth of the total area of these farms is devoted to pastures, the lowest percentage of total farm area appearing in Illinois where 11½ percent is in pasture, the highest shows approximately 34 percent—in Missouri.

TABLE I.—*Relation of Cattle Feeding to Farm Business (Corn Belt Area, June, 1919 to June, 1920, 333 Farms.)*

State.	Farms.	Farm Area.	Percentage of Farm Area.			Income from Cattle.	Crops Fed Cattle.
			Cultivated.		Pasture.		
			Total.	Corn.	Perm. and Rot.		
		Acres				Percent	Percent
Indiana.....	45	209.8	65.7	44.6	27.7	20.4	37
Illinois.....	99	225.1	83.6	42.4	11.5	24.6	26
Iowa.....	46	276.2	71.3	50.5	23.0	24.6	33
Nebraska.....	89	232.1	76.6	43.4	19.6	29.1	46
Missouri.....	54	305.3	62.7	39.8	34.1	21.1	42
All.....	333	244.9	73.7	43.8	25.8	24.5	40

I have used two methods of showing the importance of the cattle feeding enterprise in the farm business. One is the usual method, that is, showing the relation of the net returns from cattle to the net income of the entire farm. This, I believe, does not show the enterprise in its proper relation to the other enterprises of the farm, especially as to the handling of feeder animals, and when the margin between the purchase price of these animals and their sales price is narrow. Table I shows that the net income from these feeding cattle constituted approximately 25 percent of the net farm receipts.

In the last column of this table I have attempted to show the approximate percentage of feedable crops, raised on the farm or purchased and hauled to the farm, that were consumed by the beef cattle purchased and fed out. This figure as yet is somewhat of an approximation, as it has been necessary to estimate, for example, such items as the total carrying capacities of pastures in animal unit days, the animal unit pasture days for standing corn stalks and a few items of this nature, but for the principal feedable crops it is accurate, and I believe gives a somewhat truer picture of the importance of this enterprise in the farm business and its relation to the other livestock enterprises on the farm. An enterprise which converts into a market-

able product close upon forty percent of any farm's feedable crops surely cannot be left out of its system of farming, and these feedable farm crops thrown upon the markets without causing serious disruption and a resultant lowering of the production of food for human consumption.

Variations in Costs.

There is usually wide variation in the cost of similar farm products grown upon adjoining farms or even upon the same famr in different years. These differences are due primarily to the difference in efficiency of management and care in performing the necessary operations of production, but may often arise from conditions over which the producer has no control. As an example, let us take the cattle feeding cost figures gathered in Iowa for the winter 1919–20. The amount of grain fed to these Iowa cattle for each hundred pounds' gain in live weight varied from less than 500 pounds in one case to nearly 1,500 in another. The daily gain per head among these Iowa cattle varied from .8 of a pound to 3.9 pounds. The cost of a pound gain ranged from 10 cents to 43 cents. Net returns per steer varied from a loss of $61.82 per head in one drove to a profit of $50.50 in another when charging them with feeds at cash farm prices.

Table II.—*Cost per Hundredweight of Cattle. (Corn Belt Area, Winter 1919–1920, 545 Droves, 20,999 Cattle.)*

Cost per Hundredweight, Dollars.	Number of Droves.	Droves, Cumulative Percentage.	Cattle, Cumulative Percentage.	Number per Group.
8 to 9	7	1.3	1.3	277
9 to 10	7	2.6	3.2	404
10 to 11	18	5.9	7.1	803
11 to 12	56	16.1	16.3	1943
12 to 13	92	33.0	33.9	3698
13 to 14	100	51.4	54.6	4338
14 to 15	88	67.5	69.8	3187
15 to 16	67	79.8	81.3	2422
16 to 17	57	90.3	90.8	1992
17 to 18	23	94.5	94.2	720
18 to 19	16	97.4	97.9	782
19 to 20	10	99.3	99.5	331
20 to 21	2	99.6	99.8	50
21 to 22	1	99.8	99.9	25
22 to 23	1	100.0	100.0	27
Total	545			20,999

With wide variations in the quality of feeder cattle, in quantities of feed necessary to gains, the labor expended in care of animals, the gain made by hogs following, and other factors in cattle feeding, we

find a resultant wide variation in the cost of the finished product when laid down at market. We have (Table II), for the cattle under observation in the winter of 1919–20, a variation in the cost per hundred pounds of finished beef ranging from $8.00 to $23.00. The average cost of a hundred pounds lies between $14.00 and $15.00. Thirty per cent of the 21,000 cattle cost above this average figure. All of the beef cattle feeding work to date will show that an average cost figure includes at least 60 percent of production.

The cost per hundredweight of finished corn-fed cattle is influenced very materially by the grade of feeder animal at the beginning. The prices paid for feeder cattle by those men who have a cost exceeding $20.00 a hundred were considerably higher than the feeder cattle prices paid by the farmers producing the $8.00 to $9.00 finished cattle. The prices at which the $20.00 cattle finally sold also indicate that they, as finished cattle, were superior in grade to the $8.00 to $9.00 groups. This varying cost array, with its finished products ranging from $8.00 to $23.00 indicates that there are always some producers outside of the marginal cost line, producers who will get under it in time or ultimately drop out. These figures bear out the practical impossibility of establishing a price which will be remunerative to all producers and not increase the supply far beyond the point of visible demand.

Some Important Basic Unit Factors in Beef Production.

In our livestock cost work particular stress is being placed upon the securing of unit quantities of all cost factors and credit factors, to which, at any time and under any price level, current values may be affixed and from which the cost of production may thus be determined. The item of feed alone has been found in this study to constitute from 75 to 85 percent of the total cost of gain made by beef cattle in the dry-lot. The economy of production, then, rests primarily upon proper feeding and management and upon the efficiency of cattle in converting feeding stuffs into finished beef. Man and horse labor used in the care and feeding is the item of second importance constituting from 7 to 8 percent of the cost of gain in the steer.

As I have already said, corn, both as grain and in the form of silage, exceeds in total value the cost of all other feeding stuffs consumed by the cattle in our beef studies. Table III gives the quantities of feed and labor required to make one hundred pounds of beef in the 35,219 cattle covered in the studies during the past two years.

Our work so far seems to indicate that upon the average, all costs other than the feed bill are balanced off and paid for through the by-products in feeding—manure and pork—providing the cattle do not spend too much time in pasture. These expenses, other than feed, which are met by the value of pork and manure are the cost of man and horse labor, interest upon capital invested in cattle and equipment, depreciation and repairs upon the buildings used, veterinary, insurance, taxes, incidentals and the marketing expense.

TABLE III.—*Measures of Some Important Basic Unit Factors in Producing 100 Pounds Gain in Corn-Fed Cattle. (Corn Belt Area, 1918–19 and 1919–20. 866 Droves, 35,219 Cattle.)*

Factors.	Indiana.	Illinois.	Iowa.	Nebraska.	Missouri.
Gain per head, lbs.	278	253	357	278	246
Daily gain per head, lbs.	1.5	1.4	2.2	1.8	1.3
Costs					
Feed					
Grain, lbs.	535	561	701	729	443
Commercial concentrates, lbs.	106	79	37	14	113
Dry roughage, lbs.	216	338	301	506	248
Silage, lbs.	1,588	2,201	348	113	854
Pasture, days	13	12	12	11	46
Labor					
Man hours	5.0	6.4	2.4	4.7	3.8
Horse hours	1.5	3.6	2.0	3.5	4.5
Credits					
Loads of manure	1.5	2.5	.7	1.4	.3
Pounds of pork	25.4	21.3	33.5	34.3	21.2

The cattle coming under our observation in Missouri, for example, were on pasture or stalks 46 days of the 194 they were on the farm. The by-products from these Missouri cattle could not pay for all the expenses other than feed; but in the other four states where steers were on pasture or stalks only 12 or 13 days they were able to meet the expenses other than feed by the manure and pork that was produced behind them. The low credit of 21.5 pounds of pork in Illinois may be attributed principally to an epidemic of "flu" among hogs in Dekalb County during the 1919–20 winter.

CATTLE SHOWING LOSSES PAY SOMETHING FOR FEED.

Charging feeds and supplies to livestock at monthly cash farm prices as they are consumed has become a more or less established method in determining costs in animal production. This practice of using the opportunity cost or alternative price in the charging of farm

feeds evolved from a desire upon the part of the producer to determine whether each of the present parts of his entire farm system was paying him as well as might some competing crop or type of livestock. In following this practice of looking at each enterprise independent of the whole farm business there has been danger during the past few years of showing the farmer a book loss upon as much as 90 percent of his marketed produce while he well knows that his farm business has been profitable. And upon the other hand, will we not have the consumer of these livestock products demanding to be shown just how producers can take apparent losses and still show evidences of prosperity? The use of opportunity costs or the alternative price may be justified when comparing the *relative* profitableness of enterprises, but there is serious question in the use of those opportunity costs in determining the profits and losses of the livestock enterprises.

TABLE IV.—*Iowa Cattle Feeding Results With Returns Shown in Amounts Received for Corn Consumed.*

Method and Year of Study.	Survey 1918–19.	Survey 1919–20.	Route 1920.
Average farm price of corn	$1.41	$1.31	$1.32
Loss per steer (feeds at cash farm prices)	9.80	10.19	5.11
Average price realized for corn when fed to cattle	1.18	1.03	1.17
	Percent	Percent	Percent
Cattle that paid nothing for corn	3	3	—
Cattle that returned less than $1.00 per bushel for corn	35	43	38
Cattle that returned $1.00 to $1.50 per bushel for corn	37	34	24
Cattle that returned $1.50 to $2.00 per bushel for corn	12	11	38
Cattle that returned over $2.00 per bushel for corn	13	9	—

Let us take as an example the returns of cattle studied in Iowa during the past two winters. When charging these cattle with farm grown feeds at cash farm prices there was a book loss upon the average for all cattle fed. Still, while the average of these Iowa cattle were unable to pay the full opportunity costs upon all the feeding stuffs, they were able, after supplying a market for farm roughages at what may be called a good price, to return a sufficient amount for the corn that was fed to them to apparently cover the cost of producing this corn. In constructing Table IV the Iowa steers have been charged with all feed other than corn at monthly cash farm prices as these other feeds were being consumed, the balance between the gross income from each drove of steers and the amount they were charged for feed other than corn has been determined, and in dividing this balance by the number of bushels of corn fed to each drove

we are able to show what the steers paid for their corn. Of the Iowa cattle studied during the winter of 1918–19 only three percent did not sell for enough to return something for corn after paying for the rest of their feed; sixty-two percent of the cattle returned better than a dollar per bushel for corn. In the 1919–20 winter fifty-four percent of the cattle in the survey study and sixty-two percent of the cattle on the detailed cost route returned a dollar per bushel or better for corn in addition to paying market prices for the rest of their ration. While the average of these cattle fell somewhat short of paying cash farm prices for all their feed, during the first winter (1918–19) they returned an average of $1.18, those in the survey of the next winter returned $1.03, and the cattle on the detailed cost route the same winter (1919–20) returned $1.17, for every bushel of corn consumed.

Relation of Cattle Returns to Farm Profits.

The cost story of cattle feeding, for either producer or consumer, is incomplete without a presentation of the setting of cattle feeding within the farm business and the financial results of the farm business as a whole. As an extreme example let me cite the record of an Illinois farm for 1919–20. For this farm 52 percent of the income was from 60 feeding cattle, with hogs and cattle together constituting 78 percent of the income from all sales. There was a loss of $2,741.32 upon the 60 head of feeding cattle when charging them with feed at cash farm prices; in other words these cattle fell over twenty-seven hundred dollars short of paying $1.40 for corn and $25.00 a ton for clover hay. As the hogs leaving this farm sold for fourteen cents they probably did not get a 13 to 1 ratio for their corn, should this corn be charged to them at the opportunity prices. Nevertheless this farm made 8.4 percent on an investment of $42,000. This means that, while the Illinois farmer's livestock did not pay him a price for his grain and hays comparable to what he could have received for these same crops at market, they apparently paid him a considerable margin over and above what it cost to produce them.

Or looking at average figures upon several farms (Table V) where these figures were gathered from June 1, 1919, to June 1, 1920, it is readily noticeable that there is no correlation between cattle losses, when these cattle have been charged with feeds at cash farm prices, and either the farm labor income or the percent earned upon the capital invested. However there is every reason to believe that in Illinois, where the cattle enterprise could pay only twenty-seven cents for corn, the losses in feeding cattle sapped the profits made in the other branches of the farm business. On the Iowa and Nebraska

farms studied, the minus labor income may be attributed, in the main, to the relatively high capitalization of the farms, as placed by the farmer. You will notice in Table V that the Missouri and Indiana cattle, though not able to compete with the market for corn, were able to return a price sufficient to warrant them a place in the system of farming.

TABLE V.—*Relation of Returns From Cattle to Farm Profits. Corn Belt Area —Winter 1919–20.*

State.	Farms.	Farm Average.					
		Capital.	Labor Income.	Percent Earned on Investment.	Percent Feedable Crops Fed to Cattle.	Feeding Loss.[2]	Price Returned for Corn.
Indiana.....	39	$51,621	$1032	7.0	37	$− 654	.84
Illinois.....	99	79,359	997	6.3	26	−1237	.27
Iowa.....	43	102,228	− 176	4.8	33	− 337	1.08
Nebraska.....	62	84,885	−1358	3.4	46	− 557	1.00
Missouri.....	44	76,330	1417	6.9	42	−1262	.65

And so to correctly understand our livestock cost data they should be interpreted in the light of results from the farm as a whole and not alone in the light of the independent enterprise. It is probably still safe for the feeder to consider his livestock as a means of marketing farm crops and as such to expect them to receive market prices for these farm crops when they are driven to market; but should times and occasions arise when they cannot do this he must keep ever in mind the long time average results of his entire farming business recognizing the place of livestock in the maintenance of this farm income.

CONCLUSION.

Beef cattle feeding in the corn belt States is now in what may be termed a temporary slump awaiting a time when there may be less risk in the enterprise and until general economic conditions become more healthy. Cattle feeding costs show, as do studies in other farm products, a wide range between farms and from year to year in the same general area. There must still be devised a method of more nearly arriving at specific costs in any farm enterprise for use not only in comparing competing enterprises, but cost figures which will acquaint the consuming public in general with the true condition of affairs in agricultural production. Whatever the use to which enterprise studies finally may be put, whether for comparative purposes or to show the specific costs of salable products, attention should be given to the study of total profits of the farm in which the enterprise forms a part.

[2] When charging feeds at cash farm prices.

THE TREND OF PRICES.[1]

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If a person were to make a chart showing the daily fluctuations, or price movements, of some agricultural products, as wheat, corn or cotton, he would probably see a jagged line, with ups and downs, and very little or no regularity.

But if he should examine the price changes more intimately, making averages in various combinations, he would find that, behind the current, apparently irregular movements, certain general trends or tendencies exist.

For the purpose of analysis, we may assume that the price of an article at any time is subject to three distinct influences, resulting in three different kinds of trends.

These three price trends are briefly, first the seasonal trend or cycle of prices. Prices are usually lowest at harvest time, when marketings are heavy, and then advances, to decline again when the next harvest comes on the market.

The second trend is the upward and downward of the yearly average price, under the influence of supply and demand of the specific product considered, the average tending upward when the year's production is short and downward when production is large. Production is influenced largely by climatic and other conditions beyond the control or forecast of man. We may therefore always expect these yearly ups and downs.

The third trend or price movement is that which extends over a number of years; it is due to general financial and industrial conditions, to change in the general purchasing power of money, the medium of exchange, rather than to the supply and demand of a particular product. This movement is shown most clearly by index numbers of yearly prices of a group of commodities. When the purchasing power of the dollar increases, prices of commodities in general tend to decline; when its purchasing power decreases prices of commodities in general tend upward.

[1] Paper read at the eleventh annual meeting of the American Farm Economic Association, December 31, 1920.

Let us consider these three tendencies separately in a little more detail; and first, the seasonal trend or variation.

If we should chart, say, the five or ten year average price, by months, of some agricultural commodity we would very likely have, not an irregular or jagged line but a more or less gracefully curved line, steadily advancing from a minimum to a maximum and then declining rather sharply to the minimum. If we should also chart, in the same way, the average monthly marketing of the same product we might also expect to see a regular curved line, but inverse to the price line.

A tabulation is here given, showing, by months, the index number of prices to farmers of the United States of ten crops combined, and, the monthly average receipts by farmers from the sale of crops.

	Price Index, 100 = December.	Total Sales, 100 = Value Year's Total.
January	103	7.4
February	105	5.2
March	107	5.3
April	109	4.6
May	112	3.9
June	113	3.1
July	112+	6.5
August	111	7.8
September	108	12.4
October	104	15.5
November	100+	15.7
December	100	12.6

The prices here given are based upon the average farm price for the seven years 1908–1914, inclusive. This period was taken because the collection of monthly farm prices was begun in 1908, and 1914 was the last year before the abnormal war influences. Conditions were fairly normal during these seven years. It will be observed that the price movement when averaged is very regular, as is also the variation in the rate of marketing. Prices are lowest, considering all crops, early in December, advance steadily reaching the maximum in June, thence declines. Marketing of crops is heaviest in November, then decreases steadily until June, and then increases, forming a regular cycle.

Similar trends will be shown, if we confine our observation to specific products. For example, I give below, for wheat, corn and oats separately, the relative monthly price paid to farmers of the United States, and the percentage of the crop marketed by months.

	Wheat.		Corn.		Oats.	
	Relative Price.	Percent Marketed.	Relative Price.	Percent Marketed.	Relative Price.	Percent Marketed.
January	102	5.9	101	14.0	103	7.2
February	103	4.8	104	10.4	105	6.7
March	104	3.7	107	7.4	108	5.0
April	106	3.4	112	5.7	110	4.0
May	108	3.5	118	6.6	112	5.2
June	109	3.2	120	6.1	113	5.5
July	105	12.5	123	5.3	109	8.1
August	102	14.5	127	5.8	104	17.2
September	100	16.3	125	5.7	101	13.7
October	101	14.2	116	6.1	100	11.6
November	100	10.2	106	11.7	100	8.0
December	100	7.8	100	15.2	101	7.8

The seasonal cycle is much wider in the case of some crops than of others; thus taking the United States farm price average, the range from monthly low to high is only about 9 percent for wheat, 13 percent for oats, 27 for corn, 30 for potatoes and 75 percent for eggs. In general, the variation is least with crops which are non-perishable and easily kept, and widest with perishables, those which shrink in weight and are kept with more or less difficulty.

A fairly close relation is seen between the seasonal cycle of prices, and the seasonal cycle of marketing. The marketing cycle is not the same in different parts of the country, but is influenced by the time of harvest, the low point coming earlier in the southern states than in the northern states. Therefore prices do not advance or decline uniformly throughout the country.

Consider wheat, for example, in the tier of states from North to South, including the Dakotas, Nebraska, Kansas, Oklahoma, and Texas. The maximum price in each state is reached in May, but the minimum price occurs in July and August in Texas and Oklahoma, in August and September in Kansas and Nebraska and in October and November in the Dakotas.

We thus see that the seasonal trend or cycle of prices has a geographical variation, its minimum generally moving from south to north, with the progress of harvest. When we see wheat normally advancing 2 percent in Texas between August and September and at the same time declining 7 percent in the Dakotas, we can not say, without qualification, that Chicago or some foreign market makes the price in the local markets of this country.

Relative farm price of wheat, 1908–1914,
100 = for each state price in month when at minimum price.

	Texas.	Okla.	Kans.	Nebr.	S. D.	N. D.
March	112	113	111	109	109	109
April	113	114	113	111	111	111
May	113	116	114	113	114	113
June	107	108	110	109	112	112
July	100	100	103	102	111	112
August	100	100	100	100	108	109
September	102	103	101	100	101	102
October	104	105	103	101	100	100
November	106	105	103	101	101	100
December	107	105	103	102	102	102

Oats affords a striking example of the influence of latitude upon the seasonal price cycle:

Relative farm price of oats, 1908–1914,
100 = for each state, price in month when at lowest price.

	Texas.	Okla.	Nebr.	S. D.	N. D
January 1	119	114	107	106	112
February 1	...	...	...	...	...
March 1	130	129	113	113	117
April 1	128	126	115	117	120
May 1	128	130	118	118	123
June 1	127	129	118	121	125
July 1	107	113	117	122	126
August 1	100	100	108	116	128
September 1	106	102	104	102	108
October 1	109	105	103	101	101
November 1	111	105	100	100	100
December 1	113	105	103	101	102

Observe that in Texas the price is lowest when in North Dakota it is highest.

This one cycle seasonal trend is characteristic I believe of all crops. It may be observed however that there is frequently a dip, or temporary check, in the upward trend in March with the opening of spring, and a temporary increase in marketings. Hogs afford an interesting example of two-price cycles in a year, the two maximums occurring in April and September and the two minimums occurring in June and December. This double cycle is coincident with the double (spring and fall) farrowing seasons.

The extent of the seasonal variation of prices has an important

bearing upon the question as to whether it pays a farmer to hold or to sell his crop at harvest time. If the normal range from low to high in the price cycle exceeds the cost of holding, it would seem profitable to hold, on the other hand, if the cost of holding exceeds the seasonal advance in holding, there would be a loss by such holding.

It has been estimated that the cost of holding wheat for one month is 1½ percent, four months at 6 percent, eight months at 10 percent and 10 months at 11 percent, that is, the price must advance 11 percent in ten months before any profit can be secured. I believe that these estimates are high, if applied to farmers who have reasonable facilities of holding their grain. But we will assume that these estimates are about correct. Now an examination of the average farm price of wheat on the first of each month by States for the seven years 1908–14 shows in most States a slightly wider range than the estimated cost of holding, for example, the average increase during ten months, from August 1 to June 1, in Ohio is 17 percent, Indiana 18, Illinois and Michigan 15 percent, Missouri 19 percent, Nebraska 14 and Kansas 15 percent. In eight months, from October 1 to June 1, the average increase is 16 percent in North Dakota and 15 percent in South Dakota. In the six months from December 1 to June 1, the increase is 9 percent in Wisconsin, 13 percent in Minnesota and 10 percent in Iowa. These comparisons would seem to indicate that in the long run it will pay the farmer to hold, if he has the facilities to do so. It is interesting to observe that although the low price is reached at different dates in different States, being influenced by the time of harvest, the maximum price is reached in nearly all States at nearly the same time. Thus the June 1 price is the highest 1st of month average price in 31 of 37 wheat growing States, the 6 exceptions being only slight, whereas there are 18 States with low on August 1, 6 on September 1, 9 on October 1, one on November 1, and 3 on December 1.

In the case of corn both price and cost of holding varies from month to month more widely than does wheat, but the advance in price is greater than the cost of holding, justifying holding when facilities permit; thus the increase from the low to high average price is 33 percent in Ohio, 36 in Indiana, 31 in Illinois, 34 in Iowa, 28 in Nebraska, and 27 percent in Kansas.

It has been estimated that to break even for holding corn, the price should advance 7.4 percent the first month, 8.5 percent in two months, 9.3 percent for three months, 11.7 percent for four months. The minimum price in the corn belt states occurs between December 1 and

January 1, and the maximum price about September 1, or eight to nine months after the low point.

In oats the increase from low point to high point is about 20 percent, most of the State ranging between 18 and 22 percent. The averages shown for this grain crop would seem to indicate that it does not usually pay to hold for only one or two months, nor for more than ten months after harvest, the optimum being about eight months.

The advance from low to high is generally greater in localities of large surplus than in localities of deficient production. For example, Iowa produces much corn and little wheat; North Dakota produces much wheat and little corn; the increase from low to high for wheat averages 11 per cent in Iowa and 16 per cent in North Dakota; and for corn 33 per cent in Iowa and 15 per cent in North Dakota.

The conclusion, from the examination of price trends, that it pays in the long run to hold rather than to sell at harvest, is in harmony with what might be expected when one considers that during the harvest period the offerings exceed the consumptive demand, whereas later in the season the conditions are the reverse.

The effect of variations in crop production upon prices is readily seen in a general way by relatively high prices with short crops, and low prices with large crops. But a measure of the effect of a given degree of shortage or excess of production upon price is not easily determined. In the Seventh Century Gregory King reckoned that a defect of 10 percent in the corn harvest would raise the price 30 percent, a defect of 20 percent raise the price 80 percent, a defect of 30 percent raise the price 160 percent, a defect of 40 percent raise the price 280 percent and a defect of 50 percent raise the price 450 percent. Whether this relation between grain harvest and prices ever actually held I do not know, but I have manipulated the available crop and price data of the past 50 years in the United States, and have been unable to discover so striking a tendency as indicated in the so-called law of Gregory King. Modern transportation and credit facilities make such law inoperative for a limited area, as a county or state or even a nation. We know that a county may have a total crop failure without causing increased price if production elsewhere, enabling shipments into the country, is large.

It has been noted that in India where famines are not infrequent, prices of foodstuffs during such calamities do not rise in much greater proportion than the shortage, due, not to supplies coming from elsewhere, but to the reduced purchasing power of the natives, as a consequence of such famine.

I am inclined to suspect that a slight defect, not merely of harvest, but of supply, of any particular product in any locality, causes a relatively greater change in price than a more material defect. Because, in any given area habit is at first strong in stimulating demand for the short supply, and there is more or less inertia to be overcome before outside supply meets the local deficiency, but with greater shortage, this inertia is overcome, competition of substitutes come into play, and the advance is checked.

The yearly average price of a commodity in any limited area, as county or state, is of course influenced by both local production and by general production.

It is difficult to measure the strength of these two factors, local and general production, upon local price; they seem to vary considerably. I believe however that there is an inclination on the part of most of us to underestimate local conditions, or exaggerate general influences in determining a local price, as exemplified in the common expression that Chicago or the exports makes or determines the local price. Wheat prices in the United States are probably influenced more by world conditions than any other crop; and yet the spread or difference of price between different local market points vary widely from year to year; as may be shown by the annexed table showing the average price of wheat east and west of the Mississippi River.

Wheat price, east and west of Mississippi River.

	Production.		Price.		
	West Percent.	East Percent.	West Cents.	East Cents.	Difference Cents.
1912.....	84	16	76.8	97.6	20.8
1911.....	66	34	90.2	94.1	3.9
1910.....	67	33	88.8	95.1	6.3
1909.....	72	28	93.6	110.2	16.6
1908.....	..	..	87.9	96.7	8.8

In some years the price of wheat averages more than 25 percent higher east of the Mississippi than it does west of the Mississippi; in other years, less than 5 percent higher.

The third kind of price trend referred to, the long-time trend, due to the change in the value of the dollar, has been the dominant price factor since 1915. Size of production or cost of production have had little to do with the rapid advances. But even before 1915, that is since about 1896, the general level of prices has been creeping upward, whereas during the twenty-five years preceding 1896 they

tended downward. This downward trend to the nineties and upward tendency since then, is seen in the index number of commodity prices, of all important countries, as England, France, Germany, and Italy, showing the universality of the movement.

Within the past five months, we have been witnessing enormous declines in the prices of agricultural commodities. During these four months all three of these price tendencies or influences have been working in the same direction; the seasonal cycle is downward in the latter part of the calendar year. Crop yields this year have turned out not only larger than average but much larger than anticipated early in the season. There is every evidence that the turning point has been reached in the upward trend in the general level of prices and that we are beginning on a downward movement.

When these three tendencies are operating in the same direction we may expect a greater change in price than when they counteract each other. In a consideration of the probable movement of prices of a commodity at any time one should consider these three influences separately, and then their probable resultant.

In the long time upward and downward trend in the general level of prices, every thing does not rise and fall in unity, but there are varying degrees of lag. In general raw materials with an open market are the first to respond to such change. Farm crops are such products. Therefore they were generally the first to advance and are now the first to fall. Wholesale prices and retail prices lag as do land values and wages, etc.

Much has been said and written about the scarcity and high price of farm wages during the past five years. But during the years of the greatest of such complaint, that is during 1916, 1917, 1918, and 1919, farm laborers, although their wages were increased in dollars, received less purchasing power of the things they produced than they did normally before the war.

If farm laborers had exchanged their wages for wheat at current values, they would have received, in 1912, 468 bushels; in 1913, 456; in 1914, 360; in 1915, 384; in 1916, 240; in 1917, 240; in 1918, 276; and in 1919, 312 bushels, but the farm laborer more than comes to his own in 1920 with 516 bushels. In the four years, 1916–19 he received an equivalent of only 268 bushels of wheat a year, as compared with 420 in the four years before. Similarly as to corn, the laborer received an equivalent of only 438 bushels in 1916–19, as compared with 612 bushels in the preceding four years. The returns from only 17.8 acres would pay a year's wages during the past four years,

whereas 21.7 acres were required before. Of course, this relatively lower wages during the war, and relatively high wage the past year, are due to the lag in wages.

To conclude, and to summarize, if we wish to estimate the probable trend of the price of a commodity at a particular time, it may be convenient to consider separately the three component forces which largely influence the direction and then consider the probable joint effect. A knowledge of the seasonal cycle is necessary to know the best time in the year, on the average, to sell. To the question does it pay the farmer to hold at harvest, I believe, in general, for well-to-do farmers, the answer is yes, but with some exceptions.

A study of yearly average prices in different parts of the country, in conjunction with relative production, would throw much interesting light on the relative influence of local and of general conditions on local price.

It will also show the limitations to the so-called Gregory King law of prices.

A study of the movement of general price levels, besides aiding in forecasting the trend of a particular product, is instructive in measuring the degree of inertia of different kinds of transactions. Raw materials produced by farmers, are generally the most sensitive to changing monetary or general conditions.

WAGES OF MANAGEMENT.[1]

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Under the complexity of present-day agriculture, it is only through sound business practices, and by the use of a keen and alert intelligence on the part of the agricultural entrepreneur, that profits can be made and the business kept in a flourishing condition. It is necessary for the farmer, if he is to be successful, to maintain a constant watchfulness over his business and to take advantage of every opportunity which offers itself. He must exercise, constantly, the technical knowledge which he has gained during his experience as a farmer, as well as his personal resourcefulness and ingenuity in avoiding losses, great and small, to which the business of farming is peculiarly liable; losses from storm, drouth, disease, and economic mischance. It is only as he exercises an intelligent supervision over his farm that he can expect to gain any income above wages for his manual labor, and interest on the capital which he has invested in the business. Further, it is only through intelligent management on the part of the majority of farmers, that the rest of society can expect to obtain, cheaply, a supply of foodstuffs, and the produce of agriculture in general.

Wages of management arise because something is necessary to the successful management of a business beyond the mere putting forth of physical effort, and the presence of the physical factors of production. It is necessary that there be some guiding intelligence to coördinate the efforts of the laborers, some person who is willing to absorb the shocks of economic changes and to bear the losses in order to have the gains. This function is performed by the entrepreneur, and his remuneration consists in three principal parts which are distinct in their derivation, though difficult to separate in any particular business.

The first part is for insuring to the other persons engaged in the business their shares of the product, that is to the laborers, to the

[1] Paper presented for publication in the Journal of Farm Economics, 1920. Owing to a lack of funds in the Association Treasury, this paper was not printed last year.

landlord, and to the capitalist who has advanced the necessary funds.

The second and largest part of the income of the farmer-entrepreneur may be considered as his true wages of management. This is the remuneration for his mental labor, for his efforts to combine in the most effective proportions the factors of the business, to coordinate their actions, to direct them into the most profitable channels, and to surmount without loss the recurring crises of his business.

The third factor which may enter into or affect the income of the farmer results from the conjunctures of the conditions under which he is operating, and over which he has little or no control. Such are favorable seasons, the proximity of markets, of railroads, and of good highways, whose advantages have not yet been swallowed up by an increase in his rent, or in general, those conditions which for a short time cause an increase or decrease in his profits. Opposing tendencies, however, may in the long run counterbalance the profits from such a source.

If such additions to profits continue, other agents in production will demand a share of them, and at last the farmer will find himself no better off than before, except for the first increment of profit from innovations which later became permanent and were not followed by corresponding disadvantages. From these causes, especially from variations in seasons, will result a very considerable fluctuation in the farmer's profits from year to year, but very little which will not be swallowed up in the next year's loss.

The third part of that income to which is applied the term "profits" needs to be borne in mind only as a cause of a wide annual fluctuation. The other two parts, of business insurance and genuine wages of management, demand a further consideration. It cannot be said of either of these that it is not earned.

The small remuneration which the farmer may be regarded as receiving for business insurance, is paid him for a definite and valuable service to society through which he stabilizes the business and assumes the risk for the other agents in production. However, this insurance is small, and because it is not possible to determine its exact amount for a particular farm, no attempt will be made here to separate it from actual wages of management.

The second division of "profits," the farmer receives for the most valuable service he renders society, and for that service for which he alone is particularly fitted. It is scarcely necessary to repeat the assertion that without intelligent oversight on the part of the farmer-manager, his business would soon go to pieces. And when, through

favorable chances, an unintelligent and unskilled farmer is permitted to continue his business for a while, it is likely to be neither profitable to himself nor productive enough to be of value to society.

Wages of management possess the nature of a differential. They are not the same on all farms, and there is not always something left, after all expenses are paid, to which the name "wages of management" may be applied. The annual occurrence of a deficit instead of a surplus on a large number of farms is well known. It may be said that wages of management occur, for the most part, as a differential between the better and less efficient classes of farmers. *The wages of management of an individual farmer-entrepreneur represent the value, to society, of the successive judgments which that farmer must make in organizing and directing the factors of production in his business.* They differ among farmers of a given group and neighborhood, because some possess to a greater degree than others those qualities which make for efficient management. Since profits are the ultimate aim of every business, it may be said that wages of management may be measured, roughly and over a long period of years, by the profits which one farmer makes as compared to those of the farmer whose efficiency barely enables him to remain in the business.

From the farmer's point of view it may be said that, it does not matter greatly whether or not his income be divided up so that part of it is called wages of management and part of it by some other name. If his total net income falls below a certain point, he is simply forced to quit farming and go into some other business which will afford him an economic sufficiency. On the other hand, the farmer may justly demand prices for his services which will repay him for his investment in technical education, or in that experience which is essential to the agricultural business, and which is to be obtained only at a considerable cost of time and money.

From the social point of view, however, a somewhat different aspect of the question appears. For instance, in the case of price fixing, such as was necessary during the recent war, it will be found necessary to grant a price which will include an allowance for managerial services to those farmers whose products are necessary to fill the demand of the consumers. The price must permit continuance of production by these farmers, or at least, it must be sufficient to induce them to remain in the business. The difference between the level of price which will be necessary to supply a market, and the cost of production on a given farm is, over a long period of time, the closest measurement we can get of managerial ability, and comprises wages of management.

It must be borne in mind that the price necessary to supply a given market does not need to cover the expenses of the least efficient producer, for the permanently inefficient producers comprise the flotsam and jetsam of economic society, and their product is of very little significance in determining the level of price. It may be assumed that the inefficient producers are in the process of being eliminated from business, and that they can be replaced by more efficient ones.

There are also many producers each year, whose cost of production is high because of economic misfortune, often of a seasonal or temporary nature, and which the producers may expect to recoup in the following years. In other words, this is the risk which is covered by business insurance.

Again, it is possible, especially on non-specialized farms, for losses on one crop or operation to be covered by gains on another. And many farmers continue, from year to year, producing some one or two products at a loss, because they keep very poor accounts and treat a farm as one productive unit, rather than as a combination of several.

From the foregoing facts it becomes necessary to place the normal or bulk line price at a level considerably below the cost to the least efficient producer, and below the level which would be fixed in a business where there is sharper competition, and where the inefficient are forced out more quickly. A bulk line or normal price will include a differential element which, over a long period of time, will be the closest possible measure of managerial ability, whether it be called wages of management or profits.

If an attempt is to be made to measure wages of management over a *short* period, the greatest difficulty will be to eliminate temporary fluctuations and still to grant each farmer an allowance which is in direct relation to his managerial ability, and which will, in the long run, equal the difference between his cost of production and that of the bulk line producer.

Several methods for allotting a portion of income to wages of management have been employed, but none of them have been founded on any sound logical or statistical basis. Among the principal methods which have come under the writer's observation, there were three principal ones which will be discussed simply because they were the principal ones to be employed in the past.

Uniform Allowances.

In Michigan Bulletin No. 277, an allowance of $6.00 per cow is made for supervision by owner. This device is too rough and inexact

to be admissible. It fixes an arbitrary allowance for all dairies without regard to the efficiency of their management. It is strictly inelastic, and has no reasonable foundation.

Percentage of Cost.

In several studies, a method of allowing ten percent of cost for wages of management has been followed, apparently on the authority of the Department of Agriculture. This method is perversely elastic. Efficiency of management is inversely correlated to the cost of production. Hence, to allot a direct proportion of that expense as wages of management, has actually the effect of putting a premium on inefficiency rather than on efficiency of management.

Farmer's Estimate of His Own Value.

A few investigations[2] have attempted to make a rough sort of an approach to the differential cost of management by getting from each farmer, his own estimate of the value of his care of his dairy, above that as ordinary labor. The answers of the farmers, when averaged for classes or groups, have shown a relationship to the efficiency of management, but this has been small and much less in proportion than the variation in cost. While the efficient dairyman has been sufficiently conscious of his value usually to allow himself a higher wage of management than the inefficient one, the inefficient ones generally seemed to value themselves at a much higher rate than the state of their business would warrant. This method obtains a measurement of the farmer's ego rather than of his ability. The difference between such averages was not sufficient to provide any adequate measurement of the differences in ability, and therefore of the value of the managerial services.

Wages of management cannot be measured by profits alone, because every farm demands some supervision, whether it be of the most intelligent sort or not, and this costs something, whether or not the business be profitable. On the other hand, if this supervision is inefficient and results in a loss instead of a profit, the farmer can expect to receive nothing for it, but must charge it up to his own inability.

Again, profits are measured by the difference, or spread, between the cost of production and the prices for which the products are sold. Prices may not always be at the normal or long-time rate. At times

[2] For instance, in Delaware Bulletin No. 118.

they may, because of some unavoidable scarcity, rise a considerable distance above the cost of production. On the other hand, as was the case for a number of years in the dairy business, prices may be reduced considerably below the cost of production, because of an overdevelopment of some branch of agriculture, which cannot readily be adjusted to the demands of the market.

Before attempting to set forth a method for determining wages of management, it may be well to sum up the principal considerations which must be borne in mind in framing such a device, and which may serve as criteria in comparing this with other methods now in use.

1. Wages of management arise as remuneration for a definite service to society, that of direction and coördination of a business, and should be directly correlated to the efficiency with which that service is performed in a given business.

2. Supervision is necessary whether the business be highly efficient or not, and this supervision costs something whether or not there be a profit. But the farmer must expect to bear the loss of this expense if the management be inefficient.

3. The factor of business insurance may be combined with wages of management for convenience, and because it cannot be isolated by any device now in use.

4. There is an element of chance which causes profits to vary widely from year to year. It is seldom possible to tell just what part of profit is composed of true wages of management, and what part results from a favorable conjuncture of conditions, or how much profits have been reduced by an unfavorable conjuncture.

5. Therefore, profits alone cannot serve as a measure of wages of management, for a particular farm and in a particular year.

6. Profits depend on price, and price may or may not be at the normal level during a short period of time under study. By using the bulk-line cost instead of market price, the normal level of price may be followed from year to year.

7. A direct percentage of cost may not be used, because it bears an inverse correlation to the efficiency of management.

8. The device adopted must take the above facts into consideration, and at the same time must be sufficiently simple to be readily understood, and to be used in the ordinary cost of production study without demanding involved computations.

A Suggested Method of Computing Wages of Management.

It might be said that, since a bulk-line price theoretically includes wages of management, as the difference between the cost on a given

farm and the price so fixed, the farmer may be allowed to take his wages of management as profit. Hence, as far as the farmer is concerned, it is not necessary to compute wages of management at all. But it may be desired to obtain a single term which will permit a direct comparison of the success of different farmers or types of farmers. The following method has been devised with this in mind.

In devising the following method of computing wages of management, the above considerations have been borne in mind, and an attempt has been made to reconcile simplicity of computation with accuracy as far as is practicable in ordinary cost of production studies. It must be remembered that there are many factors in such studies which it is not possible to find with complete accuracy, by methods which are simple enough to be used in ordinary studies of cost. Therefore, it is often necessary to use methods which are partly arbitrary, but which closely approximate the exact facts, and which gain in facility of use what they lack in exactness.

In drawing up the following method, the guiding considerations have been: that profit is the ultimate measurement of wages of management over a long period of time, but that all of profit and of profit alone cannot be allowed as wages of management, for reasons which were explained above. To allow all of profit would simply be begging the question and would also introduce the seasonal fluctuations which it is desirable to eliminate, or at least to reduce as far as possible. Nor can any fixed proportion of profit be taken and called wages of management.

The conclusion reached on this subject was to base the allowance for wages of management, not on the actual profit, but on the profit which a farmer would make if he sold his milk at the price which would be fixed by the bulk line of cost. This hypothetical profit will be referred to below as "normal profit." Now, normal profit will be independent of fluctuations in market price but will still be greatly influenced by seasonal or temporary fluctuations. In order to overcome this, the allowance for wages of management may be based on some factor or aspect of production which shows a close correlation to profit, and which is itself a reflection of the ability of the producer.

The efficiency with which a farmer feeds his cows is probably the most significant of all tests of his ability as a dairyman. The efficiency with which he feeds will be much more nearly constant, from year to year, than will his profits, and the cost of feed per quart of milk will, therefore, be more significant than will the profit for any one particular year. In short, this method is intended to make an allowance for

wages of management in accordance to the success of the particular dairyman in keeping down the cost of feed per unit of product. The feed cost covers all sorts of feed: forage, ensilage, pasturage, and soilage, as well as grain.

The method proposed, now proceeds on the assumption that, taking a period of several years, the normal profit from a particular dairy will stand in the same relation to the bulk line, as its efficiency in feeding stands to a corresponding bulk line for efficiency of feeding (cost of feed per quart of milk). In other words, if the variation in profit in a given neighborhood is 3 cents per quart, and the variation in cost of feed is 2 cents per quart; then one would expect a dairy which is making a profit of 1½ cents per quart (*i.e.*, one whose total expenses per quart are 1½ cents less than the bulk-line cost), to spend 1 cent per quart less for feed than the dairy at the bulk line. Or conversely, if a dairy is spending for feed 1 cent per quart less than the dairy at the bulk line, then we should expect this dairy to make a profit of 1½ cents per quart, if the profits and losses for several years be averaged up.

Assuming dependable data to have been obtained from a large number of dairies, which were representative of those supplying a given market, this method of computation would proceed as follows:

A. (1) The total of expenses (no allowance for wages of management or supervision being included) is first computed and reduced to a cost per quart basis.

(2) The dairies are then arranged in order of the cost per quart, so found, and the point at which the increase in cost for a given increment of product becomes most marked, is taken as establishing the normal cost, or the bulk-line cost. This is usually at a point below which about 70 percent to 80 percent of the milk is produced.

B. (3) From the table set up for (2), the interquartile range in cost of production is found, that is, the range from the cost below which 25 percent of the milk is produced, to the cost below which 75 percent of it is produced.

(4) Next arrange the dairies in order of the cost of feed per quart of milk, and find the interquartile range for that.

(5) Divide the interquartile range of cost of production per quart, by that of cost of feed per quart of milk. The interquartile ranges are used in order to avoid the influence of exceptional and extreme cases.

(6) Ascertain the bulk-line cost of feed per quart of milk, that is, the cost for feed below which the same percentage of the milk is pro-

duced as that below the bulk line for cost per quart. For instance, if the bulk line for cost per quart is at the point below which 80 percent of the milk is produced, then the bulk line for cost of feed will be the 80 percent line for cost of feed.

(7) The factor obtained in (5) is now to be applied to each individual dairy, according to its position above or below the bulk line for cost of feed per quart of milk.

Now, letting W represent wages of management, Q, the interquartile range of normal cost, R, the interquartile range of cost of feed per quart of milk, and X, the difference between the bulk-line cost of feed per quart, and the cost of feed per quart in a given dairy; then the equation for wages of management in that dairy may be represented as:

$$W = \left(\frac{Q}{R}\right) X.$$

But the factor (Q/R) is constant for a given study, and will need only to be multiplied by X for any particular dairy.

Suppose for instance: the interquartile range for the cost per quart were 1.74 cents, and the interquartile range for cost of feed per quart 1.60 cents; then (Q/R) would be about 1.08. And if the bulk-line cost of feed per quart were 3.8 cents, then in a dairy with a feed cost of 3.4 cents per quart, the difference X would be .4 cent. Now substituting in the equation $(Q/R)X$, we get $1.08 \times .4$ cent which equals .432 cent, the allowance per quart in that dairy for wages of management.

It is not presumed that this method will determine wages of management absolutely. But it is thought that it will furnish data closely approximate to true wages of management, and but little influenced by seasonal or temporary variations. It is quite possible that a more accurate device than the above formula may be found, but the writer believes it may be of some use as a reasonably close approximation of wages of management, closely correlated to efficiency of production, and based on a factor of production closely related to the farmer's ability as a manager. It may also be of value as furnishing, in analyses of the dairy business, a method by which the efficiency and managerial ability of the individual dairymen, included in a study, may be compared directly, by means of a single significant term.

THE FARM POWER PROBLEM.[1]

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There are millions of horses and mules, hundreds of thousands of gas tractors, a great number of steam traction engines, and some millions of small gasoline and kerosene engines in use on our farms. The engines of farm-owned automobiles and motor trucks generate an untold number of horse-power hours each year. Windmills and water power are used in almost numberless cases, and still many farm operations are done entirely by hand.

We know that the use of labor-saving machinery has played a very important part in making American farmers the most prosperous in the world. And the use of labor-saving machinery nearly always means the substitution of some other form of power for man power. The fundamental problem is to determine just where it is economical and practical to substitute some other form of power for man power, and just what other form of power and size of power units should be used.

More power is required to carry on the work of growing and harvesting our crops and transporting produce to market than for any other class of work on the farm, and it is the question of what are the best sources of power for this work which is attracting the most attention today.

Until a very few years ago the horse and the mule furnished practically all the power for that part of this work which was not done by hand, but now the tractor, the motor truck and the motor cultivator have become serious competitors for certain parts of this work.

We do not know how many farmers are using tractors but the number sold by manufacturers in this country in recent years gives an idea of how their use has increased. In 1916, 28,000 were sold; in 1917, 50,000; 1918, 96,000; in 1919, 136,000. Of course, the farms where tractors are now being used constitute only a comparatively small percentage of the total, but in some sections the owner-

[1] Paper read at the eleventh annual meeting of the American Farm Economic Association, December 30, 1920.

ship of one of these machines is the rule rather than the exception among farmers.

Some of the questions in which the investigator is interested are: Are tractors profitable machines for the men who are already using them? Are they being used to the best advantage? If not, how can the efficiency of the farm be increased through their use? Should these farmers be advised to purchase other machines when their present ones lose their usefulness? What other farmers, if any, should be advised to purchase tractors?

At the beginning, I think, we must admit that the tractor is no longer an experiment. To be sure, improvements will be made in the future—many of them, but the tractors which are now available have been tried by thousands of practical farmers and pronounced successful by a great majority of them. Of course, many tractors have been tried in the past on farms where they could not be used economically and by men who were not capable of operating them efficiently, and we must expect similar occurrences in the future. But such information as we now have warrants us in laying down as one of the major premises for any unbiased investigations that the right tractor in the hands of a competent operator on a farm adapted to its use, can be used advantageously and economically. Another equally important premise is that the mechanical power units which are available today are such that very few of the farms in the country can be operated economically without the use of horses or mules. At present, then, the question is: On what farms should the work be done entirely with animal power, and on which ones should it be done partly with animal and partly with mechanical power?

To answer this question we must know first the power requirements of farms of different types and sizes, as they are now operated. And in obtaining information on this point we must remember that in doing so, we are, in a large measure, simply educating ourselves, for practically every farmer can tell how much power it takes—how many horse-days or tractor-hours—to do the different jobs on his farm.

The farmer does not know, however, and we do not know, just what amount of power can be used most profitably on a particular farm. Take plowing as an example: We often hear the statement that the tractor enables the farmer to do deeper and better plowing than he can do with horses. Necessarily, deeper plowing means more power, and greater cost. But, does any one know how much an increase of from 4 to 6 inches or from 6 to 8 inches in the depth of

plowing is worth in increased yields of different crops, on different soils, under different climatic conditions? Or does any one know just what is the best practice in preparing the seed bed after plowing and just what amount of work on it will yield the greatest net returns?

In the Great Plains area deep plowing and subsoiling have been widely advocated as a means of increasing crop yields, but a series of tests extending over several years on the experimental farms of the Bureau of Plant Industry indicated that for some crops, at least, these practices in themselves have very little effect on yields, and that under the conditions which prevailed at that time the cheapest methods of plowing and preparing the seed bed usually resulted in the greatest net returns.

The cost of the power on farms as they are now operated must also be ascertained. Before we can say whether the introduction of mechanical power will be profitable we must know the cost of the animal power used on a farm, the most economical way of obtaining it, and just how many work-stock should be kept for the greatest profit.

There is no doubt but that profitable changes in horse-management can be made on a great many farms, and the possibilities in this direction must be considered as well as the possibilities of the introduction of mechanical power. We need to know what type of animal is best suited for different kinds of farm work, and to what extent it will be possible to reduce the cost of power as generated by horses.

A considerable amount of data on the cost of keeping work-stock and the cost per day or per hour of work is now available, but the important thing is to determine how these costs can be reduced and the farm profits increased thereby. We know that horses on one farm today sometimes receive twice as much feed per year as do horses of the same general type doing about the same amount of work on a neighboring farm. There is also a wide variation in the number of days or hours of work done per year by horses on different farms.

During the past few years the low price of horses has caused a great many farmers to decide that the raising of colts is not a profitable enterprise.

In the course of a recent farm power investigation made by the Federal Department of Agriculture it was found that on nearly 75 percent of over 300 farms in Ohio, Indiana and Illinois, there were no 1920 colts. There were 2,000 horses and mules on these farms and only 120 colts less than one year of age. Obviously a great many of these farmers are of the opinion that it will be more profitable to buy horses as they are needed than to raise them. We should know

something as to where it will be profitable to raise horses or mules for replacement, and where any needed work-stock should be purchased.

Another important question to which we need a definite answer is: Under what conditions, and for what operations, would it be practical to increase the size of the team, so as to enable one man to control a larger amount of power? In some parts of the country, no matter how many horses there are on the place, or how many are being used simultaneously, the size of the team is always limited to two or three horses. In other sections a team, consisting of four, six or even more horses, is the common unit for heavy field work. Has years of experience led to the adoption of the most practical size of team in every case? Or with the proper hitches can the size of the team be increased to a point where the driver would control as much or more power, than does the operator of a tractor? We must have answers to these questions before we can say with certainty whether men with need of large units for field work should turn to mechanical power.

But let us assume that we have a farm organized and operated for the greatest profit where animals furnish all the power for field work. What will be the effect of the introduction of a tractor on that farm? Obviously the tractor will not be profitable if the same acreages of the same crops are raised, if they are tended in the same way, if the same number of horses are kept at the same cost, and if the same amount of man labor is used as before.

A study of the experience of farmers who are using tractors shows that the introduction of a tractor does not in itself often result in any radical changes in the cropping system. Too many factors, other than the power factor must be considered in deciding on the cropping system. However, since the tractor usually enables the farmer to do a greater amount of work in a given time than he can do with horses, its use sometimes makes possible the planting of crops at a better time and thus results in increased yields. Tractors have also helped many men in increasing the size of their farms, and farm management studies have shown repeatedly that, other things being equal, the larger the farm the greater is the income from it. Of course, every one cannot enlarge his farm at will, but the man who is desirous of farming a larger acreage may find that a tractor will furnish the additional power needed and at the same time do away with the necessity of providing additional man labor. Where the acreage is not increased the use of a tractor generally lessens the amount of

man labor required to operate the farm. This sometimes means a decrease in the expense for hired help. In most cases the number of work-stock is also reduced, but it is not often that enough work-stock are disposed of to pay for the tractor. A certain proportion of tractor owners also say that since the tractor does a large part of the heavy work it is not necessary to give the horses which they still keep as much feed as before. Others say that the cost per horse is as great as before the purchase of the tractor.

We must not forget that the tractor is also an efficient power unit for most kinds of heavy belt work. A recent survey in the corn-belt showed that two thirds of about 300 tractor owners visited use their machines for some belt work. A considerable percentage also increase their incomes by doing custom work with their tractors.

We also know, in a general way, how great the depreciation is on the tractors which are now in use, the amount of fuel and oil required by different tractors for different operations, the costs of keeping them in repair, and the amount of work which they do per day or per hour. But we do not have nearly enough information to enable us to determine the exact place which the tractor should occupy.

The size and type of tractor most suitable for a given farm must be considered in connection with all these questions. It is almost if not quite as difficult to determine this point as it is to determine whether or not *any* tractor will prove profitable. The farmer must choose between the wheeled and the track-laying types, he must decide whether his tractor shall be capable of pulling one plow or ten, whether it shall weigh 2,500 pounds or 25,000, whether it shall burn gasoline or kerosene. In fact he must choose one of nearly 200 models which are on the market today, and the investigator is called upon to answer the question "What tractor is most suitable for my conditions?" fully as often as "Would a tractor be profitable on my farm?" An intimate knowledge of each of the models available is necessary to answer this question. The details of construction must be known, the amount of power the tractor will develop—both on the drawbar and on the belt—the amount of fuel required, the adaptability of the tractor to different kinds of work, and the quality of its work.

We should also be able to say for just what operations it will be more economical to use the tractor and for what operations horses should still be used. A large majority of present tractor owners do the bulk of their plowing with them, and on some farms tractors may be profitable even if used for no work except plowing. But there are a number of other operations for which the use of the tractor may

be questionable. For instance: Disking and other heavy work in preparing the seed bed after plowing require a large amount of power, but in some seasons a heavy tractor will pack certain soils seriously, and on this account many tractor owners still do all this work with horses. Investigations to determine how seriously tractors of different weights and designs will pack soils of different types under different conditions would assist materially in determining the size and type best suited to particular farms. Even though the farmer knows that the use of his tractor for such work will result in a loss in unfavorable seasons, he has the choice of using the tractor every year and accepting this loss in the exceptional years, or of always keeping horses, men and machines available for doing the work if the season is unfavorable for the tractor. There are similar problems in connection with the use of tractors for many other operations.

Other points on which we particularly need further information—as definite as it is possible to obtain—are the reliability of tractors and the cost of operating them. To this end a good number of representative tractor owners should keep complete and accurate records of the work which they do, the time required for doing different kinds of work, the fuel and oil consumed, the cost of repairs, the amount and value of the time lost on account of breakage and trouble. If every state college and experiment station could obtain the coöperation of 50 or even 25 farmers who would keep accurate records regarding their machines, paying particular attention to those points on which it is difficult and sometimes impossible to get information by the survey method or the questionnaire, in a year we would know a great deal more about the reliability of tractors of different kinds, the cost of operating them, and their adaptability to different kinds of work.

A large part of farm work is done with either one or two horses as the power unit. Taking the country as a whole, more than half the time farm horses are used is doubtless spent in one or two horse units. The tractor capable of pulling two or more plows, and developing eight or more horse-power on the drawbar can not ordinarily compete with horses in work of this kind. The motor truck, the small garden tractor, and the motor cultivator, however, are mechanical power units designed especially for such work.

The "Garden Tractor" is capable of doing approximately as much work as one or two horses, and is usually equipped for light belt work. These small machines do not have the advantage of saving

man labor, which the larger tractors have, but they are adaptable to many different kinds of work, and undoubtedly there are farms on which they can be used economically. A very considerable number are now in use, and there is a persistent demand for unbiased information concerning them. Practically no investigational work has as yet been done, however. Neither do we have anywhere near enough information concerning motor cultivators to enable us to say on what farms they can be used profitably.

An investigation made through the crop reporters of the Bureau of Crop Estimates about a year ago showed that at that time there were at least 50,000 farm-owned motor trucks in the country, and that a great many more not owned by farmers were being used primarily for transporting farm products to market and carrying supplies to the farm, doing work which in part at least was formerly done by farm horses.

A study of reports from over 1,500 of these farmer truck owners in the Eastern States and in the Corn Belt showed that most of them are operating farms which are larger than the average, and which are at considerable distances from market. Experience has led most of these men to believe that the biggest advantage of a truck is in saving time rather than in reducing expense. As compared with horses and wagons the trucks save from one half to three fourths of the time required for hauling to and from these farms. A majority of the men still use their horses for some road hauling, and on over half the farms the trucks are not used at all for hauling in the fields and around the buildings. The investigations brought out many other facts with regard to the present status of farm-owned motor trucks, and made available considerable information which should be of value to other farmers who are considering the purchase of trucks. But a great deal more investigational work is necessary before we can say definitely just what farmers can own motor trucks profitably, what size and kind will be best suited to a particular farm, and for just what work it should be used. We must know more definitely the amount of hauling both on the road and on the farm itself for farms of different types and sizes and just how much the ability to get produce to market in a shorter time or to a better market than could be reached with horses and wagons is worth. We must have more definite information concerning the effect of different kinds of roads on the use of trucks, the adaptability of trucks of different types and sizes to the hauling of different materials both on the road and on the farm, the cost of operating them, the possibilities of hiring

a truck or of patronizing regularly established truck routes, and on numerous other points.

We must not consider that our task would be completed if we knew on just what farms mechanical power units can be used profitably under present conditions, which size and type will be most profitable for a particular farm and for just what operations it should be used. The man who buys a tractor or a motor truck this year will expect to be using it five years hence. Will the cost of operating it then be the same as it is today? Or will the comparative costs of doing work with it and with horses be the same as they are today? Five years ago, a gallon of gasoline cost about 12 cents and a gallon of kerosene 6 or 7 cents. Corn was worth 65 cents a bushel and oats about 35 cents. Now gasoline and kerosene are considerably higher and corn and oats are not worth any more than they were then. What will be the ratio in 1925 or 1930?

The U. S. Bureau of Mines says that at the present rate of consumption all our visible reserves of petroleum will be exhausted within 20 years, unless more efficient methods of recovery can be found. This indicates a continued high price for gasoline and kerosene. Will the prices of farm products, and especially oats, corn and hay, stay at their present level? Will farm labor become cheaper and more plentiful, and thus make the saving in man-labor, which to date has been one of the biggest advantages of mechanical power, a less important consideration?

Furthermore, we must always be expecting the development of new and more efficient mechanical power units. The tractor of today is a great deal more efficient and adaptable to a much wider range of conditions than was the tractor of ten years ago, and it is not only possible, but very probable, that there will be further improvements in mechanical power units during the coming decade. Many of the manufacturers maintain well-equipped experimental shops and employ a number of men who do nothing but build experimental machines and try out various changes and refinements of existing models, solely with the aim of making more efficient power units for use on farms. A visit to one of these shops will certainly convince any one that further improvements in mechanical power units are to be expected.

We need to know, then, the power requirements of farms as they are now organized, and as they should be organized for the greatest profit; the possibilities, limitations and cost of all the forms of power now available; and the improvements which we can expect in the future, both in animal and mechanical power.

The U. S. Department of Agriculture and all the state colleges and experiment stations have done what they could with limited funds and personnel to keep in touch with the new developments in the farm power field, and to collect and disseminate information which will aid individual farmers in determining the best forms of power for their conditions, but we all know that the importance of the problem is such that it demands a great deal more study and investigation than has been done to date. Part of the problem belongs to the farm economist, part to the animal husbandman and part to the agricultural engineer, and coöperation among all three classes is desirable in studying certain phases of the problem.

We cannot ever hope to settle the question forever and conditions are changing so rapidly, that statements, especially with regard to the relative profitableness of the different forms of power, which are true today, may be far in error five years hence. It is essential, then, that we concentrate our efforts on those phases of the problem which seem most urgent and concerning which we can expect to obtain reliable results in a reasonably short time.

If they are to have any value other than a historical one, the results of any investigation must be studied and the important points brought out must be made public before conditions have so changed as to make them inapplicable, and we must never forget that, if any investigations are to be worth the money it costs to make them, the results must be accurate and any conclusions drawn must be sound.

REPORT OF THE COMMITTEE ON TEACHING FOR THE YEAR 1920.[1]

The Committee on Teaching for the year 1919 made the following suggestions and recommendations for the consideration of the Committee on Teaching for the year 1920:

1. That a more detailed study be made of the general outline and content of the courses now being offered primarily for undergraduate credit in the various institutions.

2. That an effort be made to standardize the titles and content of the courses in agricultural economics, farm management, and allied subjects being offered in the different institutions.

3. That this inquiry be so planned as to include information regarding the regular texts, reference books, and collateral material which is being found most helpful in connection with the various courses.

In accordance with these suggestions and recommendations, your committee for the year 1920 wrote to each of the forty-eight state institutions requesting the following information concerning each course offered in agricultural economic subjects: (1) Title of course; (2) credit hours for course; (3) prerequisites to course; (4) text and references used; and (5) a brief outline of the content of each course. More or less complete data were obtained from forty-six of the institutions.

From these data the committee has made the following observations:

1. The tendency to separate courses in farm management from agronomy and other departments and to include them with the courses in agricultural economics is making material progress although there are still many institutions in which farm management is included in departments of agronomy and taught as an agronomy subject.

2. The majority of the institutions in which agricultural economic work is most developed are requiring courses in general economics or agricultural economics as a prerequisite to farm management and other allied courses. These institutions have fairly uniform courses in agricultural economics and farm management. It is in the institu-

[1] Report read at the eleventh annual meeting of the American Farm Economic Association, January 1, 1921.

tions that do not require some economic work as a prerequisite to farm management that the greatest variation in the content of the courses in farm management was found. These same institutions frequently included some work in the economics of agriculture, in farm organization, and in farm accounting in the same course which usually was designated as farm management.

3. Twenty-nine institutions require from three term hours to nine semester hours of either general economics or agricultural economics at some time during the college course in agriculture. The time of requiring this work varied from the beginning of the freshman year to the end of the senior year. Fifteen institutions do not require any courses in economics and the information was not available for four institutions.

4. The courses in farm accounting are based on Scovill's Farm Accounting as a text for the most part. The material available indicates that farm accounting is tending to develop along the right lines. Courses in general accounting have not made contact with the real problems of farm accounting and some courses in farm accounting have tended to sidestep rather than solve these problems.

5. The division of the field of agricultural economic instruction into the more highly specialized courses such as Marketing of Farm Products, Coöperation, Rural Credit, and Land Tenure or Land Economics has been done mostly in those institutions giving considerable attention to the economics of agriculture and there do not appear to be the tendencies to mingle the subject matter included in these courses to so great a degree as has been the case in the courses in farm management.

6. The following courses in agricultural economic subjects are offered in many institutions and may be said to be fairly well established:

A. Agricultural Economics—Taylor's Agricultural Economics is most frequently used as the text and is supplemented with Carver and Nourse.

B. Farm Management, usually given in two courses called Farm Management or Farm Organization and Advanced Farm Management, Types of Farming, or Farm Operation. Warren's is the text most frequently used with Taylor, Carver and Nourse as references and in a few cases as texts.

C. Farm Accounting—Scovill's is the text used most frequently.

D. Farm Cost Accounting—Scovill's is also used in this course.

E. Farm Surveys—offered separately by several institutions but usually combined with the courses in farm management.

F. Marketing of Farm Products—Weld and Cherington are sometimes used as texts and when not used as texts they usually are used as references.

G. Farm Finance—also called Rural Credit and Agricultural Finance.

H. Land Tenure—also called Land Problems and Land Economics.

I. Other courses being offered by one or more institutions but not generally offered include Agricultural Statistics, Economics of Agricultural Production, History of Agriculture, Agricultural Geography, Agricultural Industries and in some institutions the courses in Rural Sociology are listed with the courses in Agricultural Economics.

On the basis of these observations, the committee wishes to make the following suggestions and recommendations which it believes will be particularly helpful to those institutions where the work in agricultural economics is just being introduced or has not been definitely established as yet:

1. That not less than three semester hours of general economics, or agricultural economics in which general economic principles are stressed, be required of all students in agriculture.

2. That this work in economics be required not later than the first one half of the junior year and preferably be given in a sophomore year.

3. That the course in agricultural economics be required as a prerequisite to farm management and the other specialized courses.

4. That the courses in farm accounting precede the courses in farm management whenever possible.

5. That, insofar as possible, the standard number of credit hours for all courses should be three. In general, credit hours to exceed three for a semester should be granted only to advanced students working on special problems or under special conditions.

In making these suggestions and recommendations the committee is fully aware that there may be practical difficulties which will prevent some of the institutions from following them, but it believes that if they are followed whenever and wherever possible, that they will result in the giving of instruction of a higher standard in all institutions, will make the transferring of credits from one institution to another easier and more fair, and make it possible to judge more accurately of the training which graduates from the various institutions have received.

Respectfully submitted,

W. E. GRIMES,
Chairman.

INVESTIGATIONAL WORK IN FARM MANAGEMENT AND FARM ECONOMICS.

Farm Management Work in Georgia.

1. Surveys were begun several years ago in the three main divisions in the State. That is, in the Coastal Plain Region, Piedmont Region and Limestone Valleys. Mitchell County, in the Coastal Plain Region; Pike County, in the Piedmont Region, and Walker in the Limestone Region, were selected for this work. Fifty to seventy-five records are to be taken every two years for a sufficient period to permit a study of many factors affecting the organization and management of Georgia farms that can not be shown clearly by a study of only one year's duration. In all three areas cotton is used to more or less extent as the money crop, but the organization of farms in the three areas is somewhat different. We also coöperated with the Office of Farm Management and Farm Economics, U. S. Department of Agriculture, in repeating a study on over 500 farms in Sumter County, Georgia, for 1919. This study was conducted for the first time in 1913.

2. Cost accounting work with graduates of the institution who are now farming has just begun. An attempt was made to start this work with farmers who were picked out by the county agents. After a year's work it was decided that the man over thirty years old as a rule could not adapt himself to work of this kind who had not previously been keeping records. Many of them did not seem to have the training necessary to carry on the work. Therefore, a very simple book showing receipts and expenditures along the line suggested by Professor C. L. Goodrich has been put in use for the average farmer and the real detailed cost accounting confined to men who have had some training along this line.

3. The accumulation of data showing the time, its distribution and the materials necessary to carry on a given enterprise. These data have been collected in coöperation with the Office of Farm Management on cotton. Work is under way this year on tobacco. Some data have already been accumulated on peanuts. The hog industry has been started in the southern portion of the State. Various other enterprises will be taken up as rapidly as possible. The idea is to combine this eventually into a handbook for the use of the county agents.

J. R. Fain.

College of Agriculture,
Athens, Georgia.

Farm Organization and Management Projects in Illinois.

The Department of Farm Organization and Management of the University of Illinois is carrying on five somewhat definite projects, in addition to a number of minor activities which can at present be given only minor or incidental attention. The five principal projects under way at present are as follows :

(1) Detailed Farm Accounting
(2) Farm Organization Studies
(3) Farm Power Studies
(4) Land Problems
(5) Farm Management Extension

The detailed accounting studies are being conducted on thirty-one farms in three different groups which are considered to be fairly representative of three of the five important type-of-farming areas in the state. Two of these areas have been under investigation since 1912, the third only since March, 1920.

These studies cover entire farm business and include the determination of costs for all important crop and animal products. They have served as the principal basis for the studies in Farm Organization, and Farm Power Problems. They have also been of much value in making a beginning in the study of our land problems, and have furnished a valuable background for the work in Farm Management Extension.

The farm organization studies have so far emphasized mainly the Financial or Economic Organization and the Productive Organization. A beginning has been made in studying the financial requirements of different types of farming, and the distribution of the investment in various items of farm property under these types. The financial requirements of land owners and tenants carrying on different types of farming and working under different forms of tenure has also been studied to some extent.

From the standpoint of the productive organization of the farm, cropping systems and animal production have been studied with a view to ascertaining the most important facts regarding their adaptation.

The correlation of crop and animal production in the different type-of-farming areas, has been given major consideration. The physical organization of the farm has received only secondary attention. It is hoped that this phase of the problem, especially from the

standpoint of the farmstead layout, may be brought under somewhat systematic study in the near future.

The Farm Power studies carried on up to date have been concerned mainly with the study of the horse and the tractor as economical sources of farm power. The plan of conducting these investigations, and the general conclusion so far reached are reported in Bulletin No. 231 of the Illinois Agricultural Experiment Station.

The Land Problems investigations have so far been concerned mainly with the attempt to learn the principal fact regarding the contractual or lease relations between the landlord and the tenant, and to make a beginning in improving these relationships. These studies should be expanded so as to cover this important problem in a much more comprehensive manner. The tenure history of a considerable number of farms as well as the tenure history of its owners and occupants, should be studied in several of the important type-of-farming areas, especially those in which there is a high percentage of tenancy.

The work in Farm Management Extension has been confined mainly to the development and introduction of the simple system of farm accounting developed by the department in coöperation with the United States Department of Agriculture. The principal aim in this work has been to teach Farm Management facts and principles to a large number of farmers throughout the state on the basis of simple accounts kept on their own farms or on other farms in the same county or community.

W. F. HANDSCHIN.

COLLEGE OF AGRICULTURE,
URBANA, ILLINOIS,

RURAL ECONOMICS WORK IN NEBRASKA.

The most important investigation which we have under way at the present time is upon farm tenantry. This is in coöperation with the Office of Farm Management and Farm Economics. During the summer of 1920 we had men working in nine areas. These men took not less than 125 records each. We have had a force of people at work on the tabulation for more than six months and have them well under way.

We have also a project in coöperation with the Office of Farm Management upon the cost of fattening cattle. This is the second year in which a route man has been maintained near Oakland, Nebraska.

We have also under way a hail insurance investigation. Nebraska has state hail insurance and Professor Rankin and some of his assistants have been tabulating the results of this insurance.

We have a considerable number of farmers keeping cost of production records. These records are kept upon corn, wheat, oats, sugar beets, potatoes, hogs and cattle. We are basing our costs upon the number of hours of labor which enter into the production rather than upon the cost of any given operation. By finding the hours of work, we have a basis upon which to make computations when prices of labor change. In the cost of producing grains we are using the common share rental charge instead of cash rental or interest upon the investment. We have used the same proportion that was common before the beginning of the World War. Rent increased in Nebraska during the war not because the proportion of the crop given the landlord increased in most instances, but because the price received per bushel increased. If the prices drop the landlord's rental therefore decreases. The value of the land depends upon what the crop sells for. We believe that this is fairer than placing a valuation upon land.

As a matter of course we consider the cost of machinery, seed, and other items and in livestock production include cost of feed, shelter, etc.

We have also under way a small amount of market investigation. This includes direct marketing, the cost of credit business in Nebraska villages and a study of coöperative organizations in Nebraska.

H. C. FILLEY.

UNIVERSITY FARM,
LINCOLN, NEBRASKA.

FARM MANAGEMENT INVESTIGATION WORK OF THE MONTANA EXPERIMENT STATION.

The Farm Management Department was established at the Montana Experiment Station in 1913; at that time the personnel of the Department consisted of one person who divided his time about equally between teaching and investigation. Since that time work of the Department has gradually expended until at the present time five people are putting in full time on Farm Management work.

Probably the most important single piece of investigational work that is being carried on at the present time is a Farm Cost Accounting Project that is being carried on in coöperation with the Office of Farm Management of the U. S. Department of Agriculture. Two persons are putting in full time on this project. The procedure is

a modification of the "route plan" that was developed in Minnesota and has been used successfully in that State for a number of years.

According to the modified plan one man is able to look after the field work on from twenty to thirty farms, visiting each farm once a week or oftener as may be necessary. An office clerk puts in three fourths of her time in posting the records as they are brought in from the field and in making the summaries. The work on this project is proceeding very satisfactorily and we believe it is going to yield some very valuable results.

Another important project that is being carried on is a continuous Farm Management Survey in the Gallatin Valley. Records are being secured each year on one hundred farms in this area. This work will be continued from year to year for an indefinite period of time. We now have records from four years. It is thought that this work will furnish the answer to questions of farm organization that could not be answered in any other way.

A wheat enterprise survey is another project that was carried through during the past year. This was a piece of work of an emergency nature. When the price of wheat fell very rapidly in the fall it was anticipated that there would be a demand for up-to-the-minute information on production costs. A survey was therefore made during the month of September. Records were secured on 144 farms representing 18 counties. Tabulations were made and a report prepared which was ready for distribution before the end of the year. There has been a large demand for the information that resulted from this study.

A project that we expect to begin work on soon is "An Economic Study of the Farm Tractor." There is a lot of interest in this subject and very little useful information under our conditions.

We have a general feeling that there has been too much of a tendency on the part of Farm Management Investigators to put in too much of their time on problems whose solution is of no very great permanent value, at least the permanent value of which is doubtful. It will be the general policy of this Department to expand as rapidly as possible our cost accounting work as well as the continuous surveys. I believe projects of this nature will yield the greater dividends as time goes on and they are continued from year to year.

E. L. CURRIER.

COLLEGE OF AGRICULTURE,
BOZEMAN, MONTANA.

EDITORIAL PAGE.

The editors of the JOURNAL have made arrangements to secure and publish in this and subsequent issues for the current year some brief statements relating to the programs of work which are being developed by departments of farm management and farm economics in the State Agricultural Colleges. Readers of the JOURNAL have a general idea of a few of the major investigations which are under way, but the details of the working program at each station are not so well known. As a rule it is necessary to wait until the separate studies are completed and reported in bulletin form before the general trend of work in this field can be determined. In this issue progress reports are given in connection with investigations in farm economics for the State of Georgia, Illinois, Montana, and Nebraska. We are sure that these statements will be of interest to readers who are engaged in scientific research in the field of farm economics.

* * *

It has been suggested on more than one occasion that some space should be devoted in each number of the JOURNAL to short reviews of current bulletins relating to farm economics. Heretofore it has not been possible to do this, owing to the fact that association funds were somewhat limited and all of the available space has been required for the publication of papers which have been presented at the annual meetings. We have also endeavored to publish new articles that have been submitted from time to time and a few special papers have been solicited by the editorial committee. A beginning has been made in this issue by reviewing two recent publications. We hope that this section of the JOURNAL may be enlarged upon in future issues.

* * *

Judging from the comments which have been received from the Secretary-Treasurer, the members of the American Farm Economic Association were very well pleased with the subject matter which was included in the January issue. We are confident that the April number will meet with the same hearty approval. This number is somewhat larger than the average copy. We would like to maintain a journal of this size, but unless we are able to secure a large number of new subscriptions and unless an increasing number of renewals is received, the two succeeding issues for the current year must of necessity be greatly reduced.

REVIEW OF TWO RECENT PUBLICATIONS.

FRANK APP,

NEW BRUNSWICK, N. J.

Illinois Bulletin No. 231 Entitled, "The Horse and the Tractor," an Economic Study of Their Use on Farms in Central Illinois, by W. F. HANDSCHIN, J. B. ANDREWS, AND E. RAUCHENSTEIN.

This publication includes a timely study of horse labor on Illinois farms since 1912 through detailed accounting of farm management investigations carried on in the state during the past 7 years, as well as general farm accounts kept on several hundred farms of some 20 different counties, and third, by the survey studies which were obtained in the fall of 1918 on farms which were using tractors.

The average proportionate cost for these 5 years was 71.95 percent for feed, 11.28 percent for labor, 8.03 percent for interest, 3.10 percent for shelter, 3.44 percent for harness, 2.2 percent for miscellaneous. The total cost of keeping the horse ranged from $87.79 in 1913 to $156.58 in 1918. Horses were largely Percherons weighing from 1300 to 1500 pounds. The average number of crop acres per horse for the period studied was 19.95, and the number of hours per year worked per horse was 928.2.

The authors recommend that raising good colts, reducing depreciation charges and securing a large amount of work per horse were the best means of reducing the horse labor costs per acre, as well as per hour. Crop rotations adjusted so as to secure a better distribution of labor, the production of two or more classes of livestock, through a good physical organization of the farmstead, as well as the classification and schedule of farm operations were recommended. The records showed that the tractors displaced 2.38 horses per farm, and the average number of days worked was 29.85. Only 25 percent of the total labor on the farm was classified as tractor labor. The greatest difficulty found in the use of tractor was through the displacement of horses. But little saving on man labor was affected through the tractor.

The authors have illustrated their text graphically and through illustrations very effectively. They have not dealt in terms of quantities and items such as one might like to see in making a study of effi-

ciency of the work horse and the tractor. For example, they have not presented in their publication the total amount of feed and bedding consumed by the horses on these different farms. Everything has been expressed in the terms of dollars and cents, which is of comparative value only. They have not shown whether the farmers who keep horses and tractors are using as much feed by having the tractor do the heavy work as those where the horses must do all of the work. They have not shown the average life of the horse and have made no record of depreciation, but balance the depreciation against the appreciation of colts. While they recommend the raising of colts to reduce the cost of horse labor, there is no data presented to show that colts are profitable.

Cornell Memoir No. 34, "An Economic Study of Farm Layout," by W. I. MEYERS.

The author presents in a very clear and comprehensive manner the layout of New York State farms by description, drawings, and illustration. He discusses the relationship of the various factors such as fields, their shape, size, and location, to efficiency of the farm operations. The farm fence, buildings, lanes, driveways, as well as the proper location of pasture are discussed. The rearrangement of the farm layout is ably presented for these New York State farms. This publication is a valuable contribution to the study of the farm layout.

FARM ECONOMIC NEWS ITEMS.

Mr. George A. Billings, formerly with the Office of Farm Management and Farm Economics, U. S. Department of Agriculture, is now Field Secretary for the New York Farmers and North Jersey Agricultural Society, 1133 Broadway, New York City. Mr. Billings was Secretary-Treasurer of the American Farm Management Association for several years and served as President of the Association during the year 1918.

A new lease contract, known as the Land-Labor Lease, is being studied by the Office of Farm Management and Farm Economics, U. S. Department of Agriculture, in coöperation with the Department of Farm Organization and Management at the University of Illinois. This contract attempts to balance the contributions of the landlord on the one hand against the contributions of the tenant on the other. A tentative outline has been prepared and will be used by a small number of tenant farmers in Illinois who have agreed to keep the necessary records. These records will serve as a basis for a special analysis preliminary to simplifying the lease so that it may be applied to general farming regions later.

Mr. P. E. McNall, formerly Farm Management Demonstrator at Kansas State Agricultural College, is now in charge of the farm organization section of the Department of Agricultural Economics in the University of Wisconsin.

Mr. Harry C. Woodworth has been appointed Farm Management Demonstrator in New Hampshire. Mr. Woodworth is a graduate of the University of Illinois and later received his Master's degree at Cornell University. More recently he has farmed in Minnesota, in which State he has served two years as County Agent.

Mr. L. G. Dodge, formerly employed in the Office of Farm Management, and at present operating a farm in Massachusetts, has received a temporary appointment as Farm Management Demonstrator in Rhode Island.

Association Progress. It is very gratifying to report that in applying the new rule which requires payment of membership dues in advance the Secretary-Treasurer has received to date approximately 500 paid-up subscriptions. Last year there were approximately 530 active

members in the American Farm Economic Association, but this number represented the work of the entire year. We now have six months in which our entire attention can be devoted to getting new members. It should be possible to secure at least 300, thus making a total of 800 members for the year 1921. Such an addition to our finances would permit some expansion in the size of the JOURNAL OF FARM ECONOMICS and it would add considerably to our enthusiasm and interest in promoting the work of the American Farm Economic Association.

Duties of State Representatives. A member of the American Farm Economic Association has been appointed in each State to represent this organization and to enlist the support of men who may be interested in farm economic problems. It will be the duty of each of these men to solicit new subscriptions and to aid the Secretary-Treasurer in checking up old subscriptions which have been allowed to lapse. It has also been suggested that the editor of the JOURNAL might ask these representatives to furnish quarterly, short news items concerning the progress of farm economic work in their respective States. Among other things these men should report (1) changes in the personnel of departments of farm management and farm economics; (2) new investigations in the field of farm economics; (3) reports of progress in connection with projects under way; (4) announcements concerning the organization of new departments; (5) new methods of using farm management and farm economic data from an instructional standpoint.

Explanation. This issue of the JOURNAL should have been mailed to members of the American Farm Economic Association the latter part of April or early in May. Our copy was practically all in galley proof when the printers' strike was called on May 2. The latter has caused a delay of approximately eight weeks in making up and sending out the April number.